APTD-0607

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COAL CLEANING PLANT
PROTOTYPE PLANT
SPECIFICATIONS

Part VII

a report to

PROCESS CONTROL ENGINEERING DIVISION

NATIONAL AIR POLLUTION
CONTROL ADMINISTRATION

U. S. DEPARTMENT OF HEALTH,
EDUCATION, AND WELFARE

CONTRACT NO. PH-22-68-59

November 1969

Date ?

McNALLY PITTSBURG MANUFACTURING CORPORATION

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These specifications include: plant facility; sampling and testing; index of equipment; general mechanical specifications; and description of equipment (182 units). This document is intended to be used together with "A Study on Design and Cost Analysis of a Prototype Coal Cleaning Plant" and "Coal Cleaning Plant; Prototype Plant Design Drawings" each of which is bound separately.

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PART VII

PLANT FACILITY

The recommended Pilot Plant would incorporate facilities to:

1. Receive R.O.M. coal having not more than 18" lumps into the R.O.M. Hopper, deliver 400 TPH through the Reciprocating Feeder to the Vibrating Screen, Rotary Breaker and Crusher where the coal could be sized to 4" x 0 and finally to 1½" x 0.
2. Weigh and convey the 1½" x 0 raw coal to one of two steel silos, each having a capacity of 4000 tons. The capacity of the two (2) silos will be adequate to store enough crushed raw coal to run the preparation plant for one month at an average feed rate of about 50 TPH for 22 days based on one shift per day. Two separate silos would be provided for the preparation plant to draw feed from one while the other is being loaded with fresh coal either from the same mine which supplied the coal being washed or from a new, different mine. A belt scale would be provided on the 30" Raw Coal Belt Conveyor transporting crushed 1½" x 0 raw coal from the Rotary Breaker to storage.
3. Weigh and hand sample the rejects for an approximate determination of the pyrite in the material reporting to the rock bin.
4. Convey 1½" x 0 raw coal from one of the silos through a Vibrating Feeder to the Ring Mill. The 24" Conveyor to the Ring Mill is provided with a belt scale to weigh the feed to the plant and a suspended magnet to remove tramp irons. The Ring Mill will be provided with two different cages to make it possible to crush the coal to either 3/4" x 0 or to 3/8" x 0. To provide the necessary flexibility for treating all of the different sizes of crushed raw coal, an arrangement would be made to by-pass the Crusher with the 1½" x 0 raw coal. Although the plant has an average capacity of 50 TPH, the 24" H.M. Cycloid has a maximum rated capacity of 75 TPH. In case there is a higher percentage of fines (14M x 0) in the raw coal, the proportion of fines in the clean coal may become too great, making removal of moisture by the centrifuge a problem. To overcome such an eventuality, provision has been made for the 1½" x 0 feed to by-pass the

PLANT FACILITY (Continued)

raw coal crusher and increase the load to the H.M. Cycloid to produce more coarse clean coal. This will help to limit the amount of fines to assure more efficient drying in the centrifuge.

5. Wash a lower tonnage of coal in a H.M. Cycloid, by using an alternative circuit with a 20" H.M. Cycloid. These two size cycloids will also make it possible to demonstrate the efficiency of washing of a same size coal in two different sizes of cycloids.
6. Screen R.C. on a 5'-0" x 16'-0" raw coal screen to remove 14M x 0 fraction. A spare screen with 3/8" openings would also be provided so that it would be possible to change the feed sizes going to the coarse coal section as well as to the fine coal section. The following sizes of raw coal can be washed in the two sections:

Coarse Coal Section:		1½" x 3/8"
	or	1½" x 14M
	or	3/4" x 3/8"
	or	3/4" x 14M
	or	3/8" x 14M
	AND	
Fine Coal Section		3/8" x 0
	or	14M x 0

7. Wash one of the 1½" x 3/8", 1½" x 14M, 3/4" x 3/8", 3/4" x 14M or 3/8" x 14M sizes either in a 24" or a 20" H.M. Cycloid. Although the plant is designed for an average feed rate of 50 TPH, the raw coal feed can be increased to 75 TPH to increase the feed rate to the 24" Cycloid. In the fine coal section, 3/8" x 0 or 14M x 0 raw coal goes to the fine coal sump.
8. Rinse float (clean coal with low sulfur) from the H.M. Cycloid to remove entrapped magnetite, centrifuge to remove some surface moisture, weigh and load into a railway car with a loading boom.

PLANT FACILITY (Continued)

9. Rinse sink (having high sulfur and ash) from the H.M. Cycloid to remove entrapped magnetite and crush to a size of 3/8" x 0 or 14 M x 0 to liberate pyrite particles for further washing. The crusher will be arranged to crush the following sizes of sinks from the H.M. Cycloid:

1½" x 3/8"	to	3/8" x 0	or	14M x 0
1½" x 14M	to	3/8" x 0	or	14M x 0
3/4" x 3/8"	to	3/8" x 0	or	14M x 0
3/4" x 14M	to	3/8" x 0	or	14M x 0
3/8" x 14M	to	14M x 0		

The crusher will also have a by-pass arrangement to by-pass the 3/8" or smaller sinks without crushing.

10. Deliver dilute medium from the sinks and the float rinsing screens to the thickener for thickening and finally to a double drum-type magnetic separator for removing magnetite. Concentrated medium flows to the heavy medium sump, which is fitted with a level controller to control the level of the sump; a densometer and recording controller will control and record the specific gravity of the medium in the Sump. A raw magnetite bin will respond to the level control to replenish magnetite lost during the process.

11. Wash crushed sinks from the coarse coal washing section as well as the undersize raw coal from the raw coal screen in eight 8" Primary McNally-Vasman Tricones. Fine raw coal as well as crushed sinks from the coarse coal washing section may be washed in the McNally Viaman Tricones to recover clean coal of low sulfur content. There is an arrangement to by-pass the raw coal screen as well as H.M. Circuit, if coal only requires treatment in the fine coal circuit (McNally-Visman Tricones, Diester Table & Flotation). If the coal is washed only in the fine coal circuit, the rated capacity is expected to be 35 TPH. The float (clean coal) from the McNally-Visman Tricones is classified in three 14" Classifying Cyclones. Thickened coal pulp from the classifying cyclones through a vibrating

PLANT FACILITY (Continued)

cross-flow screen reports to the centrifuge w/coarse material to remove a part of the surface moisture, following which it will be weighed and loaded into a railway car along with the coarse clean coal.

12. Rewash sink from the Primary McNally-Visman Tricones either in six 8" Secondary McNally-Visman Tricones or in one No. 7 Deister Coal Table or in both set up in parallel. This is to separate light refuse particles from the heavy ones which are expected to contain mostly pyrite. The two alternate circuits are provided to determine the best washing efficiency (to obtain a low sulfur coal and a pyrite rich refuse) either by washing in the Secondary McNally-Visman Tricones at a high specific gravity, or in a Deister Coal Table.
13. Rewash sinks (from the McNally-Visman Secondary Tricones) in two (2) No. 6 Deister Ore Tables to determine if rewashing improves the recovery of pyrite. The products from the Secondary McNally-Visman Tricones, Deister Coal Table and Deister Ore Tables, after proper sampling, are pumped to a settling cone to recover clarified water for use in the plant. The underflow would be pumped into the waste pond.
14. Pump the magnetite separator tailings, classifying cyclone overflow and underflow drainage via the flotation feed sump to the flotation cells to recover low sulfur fine clean coal. The concentrate from the flotation cells after filtration reports with the clean coal in the coarse coal section for loading into railway cars. Tailings from the flotation cells are pumped to the settling cone for settling and recovery of clarified water for use in the plant, and the underflow is pumped into the waste pond.
15. Sample all the streams entering into and coming out of each different type of equipment. Composite samples will also be taken of the feed entering into as well as products coming out of the plant. There are twenty-nine sampling points, out of which twenty-seven are automatic (solid and pulp).

PLANT FACILITY (Continued)

Provision has also been made for manual sampling to collect samples from the rotary breaker rock bin and from the pulp being pumped to the waste pond.
Details on the sampling are outlined in the Sampling and Testing section.

16. Prototype plant specifications contain description on the Sampling & Testing facility, all equipment, building, etc.

Following Prototype Plant design drawings are in Part VIII bound separately:

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	$E-4065-P_2$
	$E-4065-P_3$
	E-4065-Q

SAMPLING & TESTING

Adequate testing arrangements have been provided in the plant to evaluate each coal selected for processing, and to evaluate the performance of individual equipment as well as the whole plant. The purpose of testing program is:

(a) To evaluate performances of each major piece of equipment used in the plant.
(b) To evaluate each coal selected for processing.
(c) To evaluate overall performance of the plant for cost analysis.
(d) To make comprehensive plant studies including material balances, ash, total sulfur and pyritic sulfur content balances for each candidate coal.

In order to provide adequate test data, the plant will be provided with twenty-nine (29) sampling points, twenty-seven (27) automatic solid and pulp samplers and two manual sampling arrangements.

Raw Coal Tests: Approximately 8000 tons of each test coal will be delivered to the plant. As the first 4000 tons is crushed to 1½" x 0, a raw coal sample will be collected during one to two weeks prior to the start of each test.

This sample will be collected by an automatic sampler, taking increments at five minute intervals. A total of approximately 90 increments of ten pounds each will be collected each day with alternate increments reporting to a primary sample and the remainder to a reserve sample. Sampling will continue until a minimum of 400 pounds of 1½" x 3/4" material is included in the gross sample and 75% or more of the first 4000 tons delivered and binned is sampled.

(The material reporting to the rock bin from the rotary breaker will be weighed, hand sampled, and analyzed for percent ash, percent sulfur and percent pyritic sulfur).

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SAMPLING & TESTING (Continued)

This will satisfy all conditions for ASTM D2234-65T on Mechanical sampling of coal and D492048 sampling coals classified according to ash content. It will also provide the proper gross sample to make the washability study from which plant settings can be made.

The primary gross sample will be screened to produce the following sizes:

1½" x 3/4"
3/4" x 3/8"
3/8" x 14 Mesh
14M x 28 Mesh
28M x 48 Mesh
48M x 0

Float and sink separations will be run on each size fraction at the following gravities: 1.30, 1.35, 1.40, 1.50, 1.60, 1.90, 2.20, 2.50 and 2.80. The refuse will be visually examined to see if heavier gravities are required.

Dry ash, total sulfur and pyritic sulfurs will be run on each size-gravity fraction and composites calculated for each size which might be used as feed to a piece of equipment in the cleaning plant:

1½" x 3/8"
3/8" x 14 Mesh
1½" x 14 Mesh
3/8" x 0
14M x 0

The laboratory will be equipped with sufficient equipment and personnel to provide this data within the one week period before the coal is to be tested.

Test Period Samples: From the data supplied, operating personnel can anticipate an optimum setting for each piece of equipment. As a new coal is first fed to the plant, grab samples will be

DPS:djc

SAMPLING & TESTING (Continued)

collected to check the specific gravity of operation. When the various circuits are set to the operators' satisfaction, daily runs can be started to determine optimum plant conditions to produce the maximum sulfur removal from the coal. In some cases it is likely that it will be necessary to check more than one set of alternative conditions to determine the point of optimum sulfur reduction.

Specifications for Plant Samples:

Top Size	No. of Increments	Wt. of Increment	Gross Sample Wt.
1½" (a)	70 (c)	6-10 Pounds	420-700#
3/8" (b)	70 (c)	2-4 Pounds	140-280#
14 Mesh	70 (c)	1-2 Pounds	70-140#

*When sampling primarily liquids instead of solids, one to two pints per increment shall be collected.

(a) 6-10 pound increments will be collected because ASTM specifies a minimum of 6#.
(b) 2-4 pound increments will be collected because ASTM specifies a minimum of 2#.
(c) 70 increments will be collected because, although ASTM specifies 35 increments for any analysis, 70 are required to obtain sufficient material for screen tests.

Schedule: Normally for the circuit being tested there will be one run made per day, broken into three segments. The morning (A.M.) samples will consist of a 2 to 2½ hour run and will be removed from the samplers by 12:00 noon. This will require preliminary morning work to be completed and the plant stabilized no later than 9:30 A.M. (During the plant adjustment period all automatic samplers will be inactivated except when the plant

PS:djc

SAMPLING & TESTING (Continued)

operator requests a "grab" sample for Float & Sink checks on the adjustment of any piece of equipment).

The A.M. samples will be screened and floated to determine the approximate washing gravity of the products from each cleaning unit referenced to the raw coal data.

On all samples from morning test runs, the feed and product samples will be screened, where sizes are available, at 3/4", 3/8", 14, 28, 48, 100, 150 and 200 mesh. All size fractions of feed materials and dewatered clean and refuse products applicable to the circuit or circuits being tested will be subjected to float and sink separations two gravities above and below the anticipated gravity of separation.

The afternoon (P.M.) samples will be used only for material balance of the plant in terms of percent ash, sulfur and pyritic sulfur.

Laboratory flotation tests will be made on all feeds to the flotation cells, using reagents to be selected at a later date. All size and gravity fractions as well as flotation fractions will be analyzed for percent ash, total sulfur and pyritic sulfur.

All test work or daily runs will be completed no later than 5 A.M. the following day, at which time the raw data will be fed to a computer for processing. During separate circuit testing the completed report for the previous day's run will be available for operating personnel by 7:00 A.M.

Procedures for Processing Samples: The various automatic samplers have been numbered on the plant flow sheet for the sake of orderly planning and discussion of the treatment of individual samples. A coded system will relate samples to samplers, coal being processed, tests run, size of product and date of test. It is anticipated

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SAMPLING & TESTING (Continued)

that drying of samples will be done by microwave techniques, which is a process for continuous and rapid drying of wet samples without induced heat.

Minimum Test Schedule: (One run for each operating condition)

1. Heavy Media Cycloid Circuit:

   Available Feed: (Raw coal)
   - 1½" x 3/8"
   - 1½" x 14 Mesh
   - 3/4" x 3/8"
   - 3/4" x 14 Mesh
   - 3/8" x 14 Mesh

   Normal separating gravity settings: 1.35 to 1.80

NOTE: One low gravity and possibly one high gravity separation will be required for each size of feed tested. Raw coal data may indicate that testing of all available sizes will not be necessary.

2. Tricone Circuits:

   Available Feed:
   - 3/8" top size raw coal
   - 14M x 0 crushed cycloid refuse

   Normal separating gravity settings: 1.35 to 2.50

NOTE: A minimum of one run must be made with each type of feed to the circuit.

3. Tables:

   Available Feed:
   - Secondary Tricone Reject
   - Primary Tricone Reject

NOTE: A minimum of one run is necessary for each feed to the table.

4. Flotation Circuit:

   Available Feed:
   - ½mm x 0 underflow from the various circuits.

NOTE: A minimum of one run will likely be made for each coal delivered to the plant.

DPS:djc

SAMPLING & TESTING (Continued)

5. Total Plant Circuit:

After the various plant circuits are set for their best performance in sulfur reduction, at least three prolonged runs will be made with all sampling stations of all circuits in use so that a complete plant evaluation can be made of each run. In addition to the sizing-gravity separations, and ash, sulfur and pyritic analyses, actual separating gravities and efficiencies of separation may be determined together with plant material balances. The plant feed and final cleaned coal products will have a complete analysis made as shown on the attached CT&E form to determine how removal of various components is likely to alter burning and slagging characteristics of the final product. A minimum of one run must be made for the total plant after all circuits have been set at optimum conditions.

NOTE: This means that for every coal tested there should be a minimum of four test runs made at a single feed rate chosen for each circuit in the plant. On the other hand, triplicate runs could be made for each change in type of feed or setting of equipment if confirming data is required for statistical reliability. It would thus be possible to make more than 100 runs on each type of coal delivered to the plant without exhausting the technological capabilities of the plant or the technical reasons for making the test runs.

Due to the volume of samples scheduled to be processed, it is the intention routinely to sample makeup water and plant effluent as well as any pond water or streams which might be affected by the plant operation then to process such samples in one of CT&E's Laboratories. Comprehensive analysis of feed and products will also be processed by

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SAMPLING & TESTING (Continued)

One of CT&E's Laboratories normally handling this type of work. The cost of these additional analyses would be at standard CT&E prices.

If deemed advisable, provision can be made at additional cost to include the following additional types of tests:

1. Abrasiveness test of raw and clean coal products to determine benefits of removing pyrite.
2. Thermo-gravimetric and differential thermal analysis to determine ignition temperatures and profiles of raw and clean coal products.
3. Neutron activation analysis for trace elements of raw and clean coal ash contents obtained by low temperature ashing techniques. These data could be the basis for correlation studies of particulate air pollution and high temperature reactions in combustion gases.

COMMERCIAL TESTING & ENGINEERING CO.

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MAIL ADDRESS
16130 VAN DRUNEN ROAD
SOUTH HOLLAND, ILLINOIS
(CHICAGO) 60473
PHONE 312 264-1173

Kind of sample reported to us

Sample taken at

Sample taken by

Date sampled

Sample identification by

Analysis report no.

PROXIMATE ANALYSIS	As received	Dry basis
% Moisture		
% Ash		
% Volatile		
% Fixed Carbon		
Btu		
% Sulfur		
% Alk. as Na_2O		

SULFUR FORMS	
% Pyritic Sulfur	
% Sulfate Sulfur	
% Organic Sulfur	
% Total Sulfur	

WATER SOLUBLE ALKALIES	
% Na_2O =	
% K_2O =	

FUSION TEMPERATURE OF ASH	Reducing	Oxidizing
Initial Deformation	°F	°F
Softening (H = W)	°F	°F
Softening (H = ½W)	°F	°F
Fluid	°F	°F

H is Cone Height
W is Cone Width

% EQUILIBRIUM MOISTURE =

HARDGROVE GRINDABILITY INDEX =

FREE SWELLING INDEX =

ULTIMATE ANALYSIS	% Weight As received	% Weight Dry basis
Moisture		
Carbon		
Hydrogen		
Nitrogen		
Chlorine		
Sulfur		
Ash		
Oxygen (diff)		

MINERAL ANALYSIS	% Wt. Ignited Basis
Phos. pentoxide, P_2O_5	
Silica; SiO_2	
Ferric oxide, Fe_2O_3	
Alumina, Al_2O_3	
Titania, TiO_2	
Lime, CaO	
Magnesia, MgO	
Sulfur trioxide, SO_3	
Potassium oxide, K_2O	
Sodium oxide, Na_2O	
Undetermined	

SILICA VALUE =

T250 = °F

ESTIMATED VISCOSITY
at Critical Viscosity Temperature of °F = Poises

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Charter Member

I. O. FOSTER, Manager, Midwest Division

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GENERAL MECHANICAL SPECIFICATIONS

All machinery units of our manufacture herein specified are complete with all necessary keys, collars, set screws, lubricating fittings, assembly bolts and safety guards. Parts are as follows unless otherwise specified. (See page 14.0 for belt conveyors).

1. SHAFTING: Shafting is SAE 1040 steel turned and polished in sizes 2-7/16" diameter or larger, and SAE 1018 cold drawn steel in smaller sizes. Keys are parallel square ASME standard, furnished with shafting.

2. BEARINGS: Bearings except those used for gates and for pivots, are anti-friction pillow blocks except as specified otherwise with the specific units.

3. DRIVES: Chain drive consists of ASA standard finished steel roller chain and cut-tooth driven and drive sprockets made of steel plate mounted on steel hubs. V-belt drive consists of the required number of V-belts suitable for the service and cast iron driven and drive sheaves. V-belt drive includes take-up base.

4. LUBRICATION: "Alemite" hydraulic type #1610 or larger size, pressure lubricating fittings are provided on all bearings and machinery parts requiring periodic lubrication.

5. ROLLER HOLDBACK: McNally Pittsburg Type RB roller holdback where specified to prevent reverse travel, consists of a steel center spider keyed to drive shaft and fitted with roller bearings to support a steel casing fixed to shaft supporting structure. Chrome nickel steel rollers ride freely in wedge shaped pocket between casing and spider when rotation is forward but jam to prevent reverse shaft rotation. Seals retain oil and prevent dirt from entering holdback.

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6. SAFETY GUARDS: Guards for drive chain, gears and V-belts are of expanded metal one side, 1/2" opening, 16 gage industrial mesh, with 16 gage bent steel plates on top, ends and exposed bottoms. Removable drip pans are provided for chain and gear guards. Coupling guards are plate in the 16 to 10 gage range. All guards are removable for access to machinery.

7. REDUCERS: Parallel shaft or right angle speed reducers are totally enclosed oil bath type rated to AGMA standards with a service factor of 1.25 applied to the motor horsepower and includes motor bed for the motor. Motor reducers are of the all motor type rated Class II for 24 hour service and have a shelf for motor or common bed on larger sizes. Falk or equal Steel-flex coupling used at motor.

GMG:djc

UNIT 1 - STEEL OVER HOPPER

GENERAL: Bridge and upper hopper structure to receive and direct 18" run-of-mine coal from railroad cars to steel hopper.

BRIDGE: 31' x 21' in plan; consisting of rail and floor beams supported on concrete structure and added steel girder.

HOPPER GRILLAGE: R.O.M. Hopper is fitted with grillage below the rail beams to prevent lumps larger than 18" entering the hopper. Grill to be about 2½' below rail surface. Grill members are 6" beams spaced about 2' apart.

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UNIT 2 - R.O.M. HOPPER

SIZE: Approximately 31' x 21' in plan.

RECEIVES: R.O.M. coal from railroad cars.

OUTLET: Arranged for attachment of one 42" Reciprocating Feeder, Unit 3.

CONSTRUCTION: Welded, of 3/8" steel plate. Includes structural steel stiffeners.

SUPPORT: Present concrete structure.

AKM:djc

UNIT 3 - 42" ROM RECIPROCATING FEEDER

NAME: McNally 42" Reciprocating Plate Feeder

QUANTITY: One (1)

RECEIVES: R.O.M. from plate hopper, Unit 2

DISCHARGES TO: ROM Conveyor, Unit 5

CAPACITY: 400 tph at about 34 rpm

STROKE: 8"

R.P.M: Variable 38 to 32 (approximate)

FEEDER PLATE: 42" x 1/2" x 10'-0

TRUNNION ROLLERS: Four (4) 6" dia. double flanged, cast iron

PITMAN RODS: Two (2) 2" ES steel pipes with roller bearing crank terminal and Oilite bushed crosshead terminal.

CRANKPINS: 2" dia. 1018 steel

CRANKSHAFT: 3-15/16" dia. in roller bearing pillow blocks

DRIVE: 15:1 Cone Drive hollow shaft reducer with stationary control, variable pitch V-belt drive to motor.

MOTOR: 10 HP, 1800 rpm, NEMA design B on adjustable base.

FEED HOPPER: 3/8" plate with suspended trunnion tracks and with extended drive platform. About 4 ft. high skirts.

GMG:djc

UNIT 4 - 4" x 0 RAW COAL CRUSHER

QUANTITY: One (1)

MAKE (Equivalent): Pennsylvania Crushers.

MODEL: TKB5-30B Granulator with built in by-pass.

RECEIVES: 4" x 0 raw coal from Rotary Breaker.

PRODUCT: 1½" x 0, 200 TPH.

GENERAL: The frames are heavy plate steel. Cage sides and crushing rings are castings. Liners, breaker plates, cage bars, crushing rings and other internal parts are made of manganese steel to take shock and wear. Rotor shaft is forged steel.

DRIVE: V-belt from 125 HP, 1200 RPM NEMA B Motor on slide base.

AKM:djc

The Units 5 through 11, 104, 109, 110, 111, 128, 132, 133, 142 and 149 which follow are "present"(P) or "present altered"(PA) equipment generally. All will be made serviceable either as described hereafter or as found to be required upon critical examination during our installation.

UNIT 5 - 48 x 10 R.O.M. CONVEYOR (PA)

The present 48" x 10" Scraper Conveyor shall deliver 400 TPH of 18" x 0 run-of-mine coal from Feeder, Unit 3 to Breaker Feed Conveyor, Unit 6 at 100 FPM. Conveyor has a rise of about 54 ft. in its about 100 ft. terminal centers. Our renovation includes: new 100 HP, 1200 rpm NEMA B Motor, H.S. coupling, motor support and guards for present chain drive and for new coupling.

UNIT 6 - 48 x 14 BREAKER FEED CONVEYOR (PA)

The present 48" x 14" Scraper Conveyor shall deliver 400 TPH of 18" x 0 R.O.M. coal from Scraper Conveyor, Unit 5 to present Vibrating Screen, Unit 7 at 100 FPM. Conveyor has a rise of about 70 ft. in its about 104 ft. terminal centers. Our renovation includes: new 100 HP, 1800 rpm NEMA B motor, reducer, H.S. coupling, drive chain, driver sprocket and guards.

UNIT 7 - R.O.M. SCREEN (PA)

The present 6' x 8' Link-Belt Vibrating Screen shall deliver 18" x 1½" overproduct to present Rotary Breaker, Unit 8. 1½" x 0 through product will join with the 1½" x 0 product of 4" x 0 Raw Coal Crusher, Unit 4. Our renovation includes new deck plate of 3/8" steel with 1½" perforations and drive guard.

UNIT 8 - ROTARY BREAKER (PA)

The present Rotary Breaker shall deliver 200 TPH of broken coal to 4" x 0 Raw Coal Crusher, Unit 4. Our renovation includes: new 40 HP, 720 rpm motor, V-Belt drive and guard, driver shaft with bearings and pinion to match the present bull-gear, and a new set of breaker screen plates for sizing R.O.M. coal to 4" round x 0.

UNIT 9 - CHUTES TO & FROM BREAKER (PA)

Present chutes of R.O.M. screen, feed and discharge of Rotary Breaker and Raw Coal Crusher, Unit 4, shall be renovated wherever required with 1/4" steel plate and 10 gage covers. 1/4" abrasion resistant (AR) steel bottom liners will be provided in the feed chute, screen through product chute and Rotary Breaker hopper if wear or present condition warrants.

UNIT 10 - ROCK CHUTE (P)

New bottom plate will be provided in the feed end of this present chute at site.

UNIT 11 - ROCK BIN WITH GATE (P)

Existing gate will be renovated, if required. New bottom liners will be provided at site in the present rock bin which handles refuse from the Rotary Breaker to the truck.

UNIT 104 - 24" W.C. BELT (PA)

The present 24" Belt Conveyor shall deliver 50 TPH of washed coal at 125 FPM from 18" Clean Coal Screw, Unit 48 to 24" x 4" Clean Coal Scraper Conveyor, Unit 108. Conveyor has a rise of about 16 ft. in its about 49 ft. terminal centers. Our renovation includes: new 5 HP, 1800 rpm, NEMA B Motor coupled to Reducer

AKM:djc

UNIT 104 - 24" W.C. BELT (PA) (CONTINUED)

with base, drive chain, driver sprocket and guard, 35° troughers, training troughers, return idlers and return trainers. See Unit 105 for Belt Scale applied.

UNIT 109 - LOADING BOOM (PA)

Present Loading Boom receives washed coal from clean coal conveyor, Unit 108, and discharges into railroad cars. Our renovation includes: new 15 HP, 1800 rpm, NEMA B Motor, reducer and coupling, drive chain, driver sprocket, guard and take up base.

UNIT 110 - BOOM HOIST (PA)

One Boom Hoist shall be utilized out of the present hoists, to raise and lower Loading Boom, Unit 109 while loading coal into railroad cars.

UNIT 111 - CAR RETARDER (PA)

One Car Retarder shall be utilized out of the present retarders, to stop railroad cars for loading coal. This unit will handle one car at a time on a 2% track grade.

UNIT 128 - 50' DIAMETER CONE (PA)

Present Settling Cone receives tailings from Tailing Sump, Unit 101; Underflows to Refuse Sump, Unit 129; and overflows either to Fine Coal and Clarified Water Sumps or to Waste Pond. Cone may not require any renovation.

UNIT 132 - FRESH WATER PUMP # 1 (PA)

This present pump will be renovated, if required, at site.

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UNIT 133 - FRESH WATER PIPE (PA)

Major length of this pipe is buried underground and is difficult to assess its condition. When our renovation work for other units will be done, this present pipe will also be renovated, if required at site.

UNIT 142 - TRUCK SCALE (PA)

Present housed Toledo Truck Scale will be primarily used to weigh rocks from Rotary Breaker, Unit 8, and will be rebuilt to include: new Toledo Model 34 Head having a 20,000 pound dial graduated by 20 pounds, 4 unit weights, Autorange on the dial, Type 400 Printer and extension lever to fit the 34 head to existing levers.

UNIT 149 - STACKS (P)

Present 8' diameter Concrete Stack and Plenum Chamber in preparation plant will be put into service to vent acid and chemical fumes. Present 30" diameter Steel Stack in preparation plant, which will be connected with two of the gas heaters, will be serviced to discharge exhaust gases to atmosphere.

AKM:djc

UNITS OF SAMPLERS: Solid and pulp samplers fitted with stainless steel cutters are provided to evaluate the following:

1. Individual equipment performance.
2. Each coal selected for processing and,
3. Overall performance of the plant.

In order to provide adequate test data, the plant would be provided with one each of the samplers as tabulated below:

UNIT	SAMPLER NAME	HANDLES
12	Raw Coal	1½" x 0 from Units 4 and 7
30	Raw Coal	1½" x 0 or products from Unit 28
34	Coarse Raw Coal	Overproducts of raw coal screen Unit 32
40	Heavy Media Floats	Floats for Unit 38
45	Float Coal	1½" x 14M from Unit 43
49	Dryer Effluent	Effluent from Centrifuge Unit 46
51	Heavy Medium	Heavy medium from Float & Sink Screens
53	Dilute Medium	Dilute medium and slimes from Units 43 & 69
65	Separator Tailings	Tailing of Magnetic Separator - Unit 60
66	Heavy Media Sinks	Sinks from Unit 38
71	Coarse Sinks	Overproduct from Unit 69
74	Secondary Crusher Product	3/8" x 0 from Unit 72
75	Fine Raw Coal	Underproduct from R.C. Screen Unit 32
80	Fine Clean Coal	Float from Primary Tricones, Unit 78
85	Cyclone Underflow	Underflow from Classifying Cyclones Unit 83
88	Screen Overproduct	Overproduct from Vib. Cross Flow Screen
89	Screen Thru-Product	1/2mm x 0 from Unit 86
90	Cyclone Overflow	Float from Class. Cyclones Unit 83
93	Flotation Feed	Underflow of Flotation Feed Sump
96	Froth	Washed coal from Flotation Cells, Unit 94
99	Tailings	Tailings from Unit 94 cells
106	Washed coal	Washed coal from W.C. Belt, Unit 104
112	Prim. Tricone Sinks	Sinks from Primary Tricones, Unit 78
117	Secnd. Tricone Float	Floats from Secondary Tricones, Unit 115
121	Secnd. Tricone Sinks	Sinks from Second. Tricones, Unit 115
125	Table Floats	Floats from Ore & Coal Deister Tables
126	Table Sinks	Sinks from Ore & Coal Deister Tables

KM:djc

UNITS OF CHUTES & SLUICES

The following tabulated chutes, sluices and similar platework represent the equipment units designated. The table shows only one of the many sizes of material handled.

General construction is 1/4" steel plate with 10 gage steel covers for confinement. Extensions as hoods or casings are 3/16" steel. Sloping bottoms are lined with 1/4" abrasion resistant steel plate only as noted ARL herein (generally in the main raw coal flow). Standard weight steel pipe will be used for many of the extensions of the sluice work.

GATES: Lever or chain operated flop gates are noted as manual (man.). Motor operated gates are noted by horsepower size of motor and include reducer, crank, pitman to lever, and limit switches.

UNIT	NAME	HANDLES	LINER	REMARKS
13	R.C. Sample Chute	1½x0		3/4 HP Gate
16	R.C. Outlet	1½x0	ARL	3 HP Gate
	By-Pass Chute	1½x0	ARL	
	4-Way Chute	1½x0	ARL	
18	R.C. Outlet	1½x0		
	4-Way Chute	1½x0	ARL	
23	Feeder inlets (2)	1½x0	ARL	Man. Gate
	Feeder outlets (2)	1½x0	ARL	
25	R.C. Outlet	1½x0	ARL	
29	Crusher Inlet	1½x0	ARL	3 HP Gate
	By-Pass Chute	1½x0	ARL	
	Crusher Outlet	3/4x0	ARL	
31	Scn. & By-Pass Chute	3/4x0		Man. Gate
	R.C. Sample Chute	1½x0		
33	Screen Chute	1½x3/8		
	Screen Hopper	3/8x0		
39	Overflow Sluices	1½x3/8		
	Underflow Sluices	1½x3/8		
41	H.M. Float Sample Slu.	1½x3/8		

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UNITS OF CHUTES & SLUICES (Continued)

UNIT	NAME	HANDLES	LINER	REMARKS
44	Screen Chutes T/F	1½x3/8		
	H.M. Hopper	fluid		
	D.M. Hopper	fluid		
	Hopper Sluices	fluid		
47	Inlet Chute	1½x3/8		
	Outlet Chute	1½x3/8		
52	H.M. Sample Sluices	liquid		
61	M-Separator Sluices	fluid		
	Magnetite Chutes	Mag.		
67	H.M. Sink Sample Slu.	1½x3/8		
70	Screen Chutes T/F	1½x3/8		
	H.M. Hopper	fluid		
	D.M. Hopper	fluid		
	Hopper Sluices	fluid		
73	Crusher Inlet	1½x0		Man.Gate
	By-Pass Chute	3/8x0		Man. Gate
	Crusher Outlet	3/8x0		
79	Tricone O'Flow	3/8x0		
	Tricone U'Flow	3/8x0		
84	Cyclone O'Flow	60Mx0		In piping
	Cyclone U'Flow	3/8x0		
87	Screen Inlet	3/8x0		
	Screen O'Flow	3/8x0		
	Screen U'Flow	½mmx0		
95	Froth Sluice	½mmx0		
	Tailings	½mmx0		In Piping
100	Tails Sample Slu.	½mmx0		
107	Chutes T/F W.C. Sampler	1½x0		
116	Tricone O'Flow	3/8x0		
	Tricone U'Flow	3/8x0		

GMG:djc

UNITS OF CHUTES & SLUICES (Continued)

UNIT	NAME	HANDLES	LINER	REMARKS
120	Table Side Sluice	3/8x0		
	Table End Sluice	3/8x0		
124	Table Side Sluices	3/8x0		
	Table End Sluices	3/8x0		
127	Table Sampler Slu.	3/8x0		

GMG:djc

GENERAL BELT CONVEYOR SPECIFICATIONS

Belt Conveyors on the following pages are fitted as described below, or as specified therein.

(a) FRAMES: Frames are steel plate specially formed to embody deck plate and gunwales in a single part; or braced channel stringers without deck as noted. Frame includes floor stands or hanger; rigid structural steel terminal beds; floating pulley carriage with guides for gravity take-ups and take-up guards. Add counterweight concrete at job site.

(b) BELTING: Goodrich or equal Flexseal "M". Covers are RMA Grade 2.
30" Belt in Units 14 & 17 and 24" belt in Units 24 & 26 are all 2 ply construction.
(c) IDLERS: Troughers are 35° 3-roll type, but 20° troughers are used next to head and tail pulleys. Troughers, training troughers, return idlers, and return trainers have 5" diameter tubular rolls. Return idlers have a 4¼" drop hanger. Trainers are complete units on central pivot to deflect any side creep in belt. Idlers are Stephens-Adamson, Style 755-X or equal, roller bearings and fitted for lubrication from one side.

IDLER SPACING: Carriers at 4' average but 1'-6" at inlet; returns at 10'-0; trainers at 100'-0 on both runs except two at 16'-0 approaching head pulley and two at 30'-0 approaching tail pulley when length and layout permit.

(d) PULLEYS: Welded steel construction with closed ends and solid hubs. Stress relieve after welding and before machining hubs and faces of pulleys. Pulleys have pressed in shaft using pipe spacer between hubs for 5-7/16" and larger shaft sizes. Tail snub pulley shaft is welded through end plates and the shaft ends are machined. Minimum face widths of pulley is belt width plus 4". Drive pulleys have 3/16" thick Neoprene Minet-Lagging.

GENERAL BELT CONVEYOR SPECIFICATIONS (Continued)

(e) BELT CLEANERS: Counterweighted blade scraper with 5" x 3/4" thick rubber blade at each discharge pulley; steel scrapers at pulleys near discharge end.

AKM:djc

UNIT 14 - 30" RAW COAL STORAGE BELT

QUANTITY: One (1)

RECEIVES: 1½" x 0 raw coal from crusher, Unit 4 and Vib. Screen, Unit 17.

DISCHARGES TO: 1st R.C. Bin, Unit 19 or 30" R.C. Transfer Conveyor, Unit 17.

CAPACITY: 400 TPH

SPEED: 400 fpm

TERMINAL CENTERS: 237 ft. horizontal

LIFT: 78 ft. HOLDBACK: McNally Pittsburg No. 3 RB

BELTING: 30" wide
COVER: Top 3/16"; Bottom 1/16"
SPLICE: Vulcanized

PULLEY DIAMETER:
DRIVE: 24" lag
TAKEUP: 24"
TAIL & BEND: 20"

PILLOW BLOCKS: Roller bearing

DRIVE: 50 HP, 1800 rpm NEMA B motor; coupled to 230 rpm output AGMA Class II reducer on base; ASA 160 chain drive.

TAKEUP: Gravity

SKIRTS: 10 ft. of 3/16" steel skirts with 5" x 3/8" rubber edge seals.

BELT SCALE: Unit 15 is used on this conveyor.

AKM:djc

UNIT 17 - 30" R.C. TRANSFER CONVEYOR

QUANTITY: One (1)

RECEIVES: 1½" x 0 coal from Raw Coal Belt Conveyor, Unit 14.

DISCHARGES TO: 2nd Raw Coal Bin, Unit 19.

CAPACITY: 400 TPH

SPEED: 400 fpm

TERMINAL CENTERS: 68 feet horizontal

BELTING: 30" wide.
COVER: Top 3/16"; Bottom 1/16"
SPLICE: Vulcanized

PULLEY DIAMETER:
DRIVE: 24" lag
TAIL: 20"

PILLOW BLOCKS: Roller bearing

DRIVE: 7½ HP, 1800 rpm NEMA B motor; coupled to 280 rpm output AGMA Class II reducer on base; ASA 80 chain drive.

TAKEUP: Screw

SKIRTS: 10 ft. of 3/16" steel skirts with 5" x 3/8" rubber edge seals.

AKM:djc

UNIT 24 - 24" R.C. CONVEYORS

QUANTITY: Two (2), each as follows:

RECEIVES: 1½" x 0 coal from one Raw Coal Bin, Unit 19, via Vib. Feeder, Unit 22.

DISCHARGES TO: 24" Washery Feed Conveyor, Unit 26.

CAPACITY: 75 TPH

SPEED: 150 fpm

TERMINAL CENTERS: 30 ft. horizontal

LIFT: 8 Ft.

BELTING: 24" wide.
COVER: Top 3/16"; Bottom 1/16"
SPLICE: Vulcanized.

PULLEY DIAMETER:
DRIVE: 24" lag
TAIL: 20"

PILLOW BLOCKS: Roller bearing

DRIVE: 5 HP, 1800 rpm NEMA B motor; coupled to 100 rpm output AGMA Class II reducer on base; ASA 80 chain drive.

TAKEUP: Screw

SKIRTS: Full length 3/16" steel skirts with 5" x 3/8" rubber edge seals.

AKM:djc

UNIT 26 - 24" WASHERY FEED CONVEYOR

QUANTITY: One (1)

RECEIVES: 1½" x 0 raw coal from two 24" conveyors, Unit 24.

DISCHARGES TO: Raw Coal Crusher, Unit 28 or by-pass.

CAPACITY: 75 TPH

SPEED: 150 fpm

TERMINAL CENTERS: 236 ft. horizontal

LIFT: 60 Ft. HOLDBACK: McNally Pittsburg No. 3 RB

BELTING: 24" wide.
COVER: Top 3/16"; Bottom 1/16"
SPLICE: Vulcanized.

PULLEY DIAMETER:
DRIVE: 24" lag
TAKEUP: 24"
TAIL & BEND: 20"

PILLOW BLOCKS: Roller Bearing

DRIVE: 7½ HP, 1800 rpm NEMA B motor; coupled to 100 rpm output AGMA Class II reducer on base: ASA 100 chain drive.

TAKEUP: Gravity

SKIRTS: 10 ft. of 3/16" steel skirts with 5" x 3/8" rubber edge seals.

BELT SCALE: Unit 27 is used on this conveyor.

AKM:djc

UNITS OF BELT SCALES

UNIT 15 - R.C. BELT SCALE on 30" belt, Unit 14 handling 400 TPH of 1½" x 0 at 400 fpm.

UNIT 27 - WASHERY FEED BELT SCALE on 24" belt, Unit 26 handling 75 TPH of 1½" x 0 at 150 fpm.

UNIT 105 - W.C. BELT SCALE on 24" belt, Unit 104 handling 50 TPH of 1½" x 0 at 125 fpm.
Each of the above three belt scales is as follows:

MAKE (Equivalent): Ramsey "VEY-R-WEIGH", Model 10-11.

SCALE: Carriage frame assembly, trunnion type frictionless pivots, load sensor bridge with adjustable jack screws, weight transducer with positive mechanical overload protection, transducer power supply junction box, calibration box with adjustments and test weights.

PICK-UP: Digital belt speed sensor and multiplier.

INSTRUMENTS: Model 40-15A Totalizer, 7-digit counter, NEMA 4 enclosure with output rate (T.P.H.) transmitter and pulse output for remote counter.

6-digit Repeater Totalizer and Rate of Flow Indicator both for remote mounting.

ACCURACY: Within ± 1% throughout 1/3 to full range of capacity based on Ramsey approved testing and maintenance.

AKM:djc

UNIT 19 - R.C. STORAGE BINS

QUANTITY: Two (2), each as follows

DUTY: Receive 1½" x 0 raw coal from conveyor Unit 14 or 17 for storage while discharging through feeder Unit 22 from other bin. Bin also supports structure and conveyors over each.

CAPACITY: 4000 tons at 50 PCF.

WALLS: 60 ft. diameter x about 79 ft. high of 1/4" steel plate. Arranged for tunnel passage and vent of Unit 20.

SUPPORT: Plate cylinder rests mainly on concrete wall foundation.

BOTTOM: 1/4" steel plate 90° cone supported on inert fill and connected to tunnel structure Unit 20 and to Unit 21 plate hopper.

ROOF: 11 gage steel plate 90° conical cover on steel rafters to ring girder at top opening.

PAINT: Apply bitumastic or equal to inside of walls where fill is to be added.

REFERENCE: Drawing E-2946-47

GMG:djc

UNIT 20 - STEEL TUNNEL & VENTS

One (1) tunnel structure connecting outlets of two R.C. Bins to enclose withdrawal equipment and service space therefor. The area within bin walls will be buried by the inert fill for bin bottoms.

Tunnel consists of structural steel frame covered with 1/4" steel plate and resting on concrete foundation with slab floor. Two (2) 18" diameter steel pipes provide inlet air to be exhausted by wall fan of Unit 147. Apply bitumastic paint to shell plate exterior before burying.

UNIT 21 - R.C. HOPPERS

Two (2) 3/8" steel plate pyramidal hoppers with stiffeners, applied in Unit 20 tunnel structure for discharge from Unit 19 bin bottoms.

GMG:djc

UNIT 22 - R.C. VIBRATING FEEDERS

QUANTITY: Two (2), each as follows

MAKE (Equivalent): Jeffrey Electric Vibrating Feeder

SIZE: No. 3DHS, with below deck, magnetic power unit

RECEIVES: 1½" x 0 R.C. from Storage Bin, Unit 19

DISCHARGES TO: Belt conveyor, Unit 24

CAPACITY: 25 to 75 TPH

TROUGH: 24" wide x 48" open pan with 1/8" stainless steel bottom liner.

MOUNTING: Suspended and installed with deck on 6° down slope

CONTROLS: For operation from 460 volt, 1 phase, 60 cycle supply current.

Individual, locally mounted, 8SCRM Rectifier mounted in NEMA 12 dust-tight enclosure with motor driven rheostat for remote speed control and start-stop.

GMG:djc

UNIT 28 - RAW COAL CRUSHER

QUANTITY: One (1)

MAKE (Equivalent): Williams Patent Crusher & Pulverizer Co., Inc.

TYPE: Model C-32 Ring Hammer Mill

RECEIVES: 1½" x 0 coal from raw coal belt conveyor Unit 26

CAPACITY: 50 TPH to 3/8" x 0 product. 3/4" x 0 product can be obtained by changing complete set of cage bars provided extra with this unit.

CONSTRUCTION: Heavy steel plate welded frame, strongly reinforced, with metal trap and easy access to all working parts and protected by renewable abrasion resistant steel liners. Roller bearings are contained in sealed housings.

DRIVE: V-Belts to 75 HP, 1800 RPM motor on rails.

GMG:djc

UNITS OF VIBRATING SCREENS

Vibrating Screens are described and tabulated below:

MAKE: Allis-Chalmers or equal

MODEL: Low-head set horizontal with back plate, drip angles, Piggy-back drive and square side plates. Except for Unit 32 all have cross dams at each panel joints.

MOUNTING: Cable suspended

DECK: All screens have single deck with Bixby-Zimmer Type 304 stainless steel 1/8" Tri-Rod. Unit 32 screen has an extra screen cloth of spring steel woven wire for 3/8" square sizing for use in place of the 14 mesh operation.

DRIVE: Each screen is V-belt driven by one (1) NEMA Design "C", 1800 RPM motor.

UNIT	SCREEN	QTY.	DECK OPENING	FEED TPH	SIZE (ft.)	MOTOR HP
32	Raw Coal	1	14M	75	5x16	10
43	Float	1	1/2mm	35	5x16	10
69	Sink	1	1/2mm	20	3x16	7½

AKM:djc

UNITS OF SUMPS

The following specifications and tabulation cover the sump units furnished.

Sumps generally are 60° cone with cylindrical upper sides and flat base for support (or otherwise tabulated). Sumps include overflow box with outlet pipe, drain-out connection for valve, and perforated plate guard screen, each where required. Typical construction is 1/4" steel plate for cone, sides and screen, 3/16" plate overflow box, 1/2" support base and nominally standard weight steel pipe.

1. Unit 36 has 1/4" abrasion resistant steel plate liner 4 ft. up cone and on cylindrical section under cone.

2. Unit 56 has rectangular section, 10 gage steel cover in lieu of screen and is fitted with 14" motorized plug valve for storage. Valve is cast iron seating rings, one with pipe stack cable suspended from 80 ft. lb. stalled torque motor.

3. Unit 101 is pyramidal for installation in existing concrete sump structure which collects any overflow for disposal into floor drainage system. Building floor is considered as protective cover.

4. Unit 113 overflows through box made in common with Unit 81.

5. Unit 129 is existing metal sump to be reconditioned for use by us on the site.

(Continued)

GMG:djc

UNITS OF SUMPS (Continued)

UNIT	NAME	QTY.	DIMENSIONS (ft.) Plan	Height	REMARKS
36	Cycloid Feed	1	8ø	10	See Para. 1
56	Clarified Water	1	5x6	15½	See Para. 2
76	Fine Coal	1	8ø	8	
81	Classifying Cyclone Feed	1	8ø	8	
91	Flotation Feed	1	8ø	8	
101	Tailings	1	11x14	10	See Para. 3
113	Secondary Fine Coal	1	8ø	8	See Para. 4
129	Refuse (PA)	1	10x10	12	See Para. 5

UNITS OF PUMPS

The following specifications and tabulation cover the pump units furnished, unless specified elsewhere herein.

Unless otherwise noted, pumps are Allis-Chalmers or equal, single suction enclosed impeller, solid handling, type CW of NiHard and Allisite construction. Replaceable wear plates are provided on both sides of the impeller. Units 37, 77, 82 and 114 are NiHard in the wetted area. Drives are variable-pitch, V-belt to NEMA Design B, 1800 rpm motor.

Pump type EB Unit 134 and type DGHB Unit 135 are water handling, cast iron bronze fitted, end suction with base and coupling. Drives direct connected.

Tonnage and material handled are shown in the flow diagram.

UNIT	PUMP NAME	QTY.	GPM SP. G	TOTAL HEAD (ft.)	SIZE TYPE	PUMP RPM	MOTOR HP
37	Cycloid Feed	1	1245 1.50	115	8x6x21 CW	900	125
57	Clarified Water	1	1300 1.00	130	6x5x17 CW	1210	75
58	M-Separator Feed	1	250 1.35	65	5x4x17 CW	850	20
77	Fine Coal	1	880 1.05	130	8x6x21 CW	930	60
82	Class. Cyclone Feed	1	787 1.05	110	8x6x21 CW	850	50
92	Flotation Feed	1	723 1.01	65	5x4x17 CW	910	25
102	Tailings	1	1303 1.01	80	6x5x17 CW	1000	40
114	Second. Fine Coal	1	504 1.06	80	5x4x17 CW	950	25
130	Refuse	1	723 1.01	50	5x4x17 CW	910	25
134	Fresh Water #2	1	600 1.00	130	6x5 EB	1750	30
135	Seal Water	1	60 1.00	150	1½x1½ DGHB	3500	5

AKM:djc

UNIT 38 - HEAVY MEDIUM CYCLOIDS

QUANTITY: One (1) 20" and one (1) 24" for alternating use as needed, each mounted on steel stand.

MAKE: McNally Pittsburg, cycloidal intake

FEED: 60 TPH (Max.) of raw coal and 1125 GPM controlled medium

OVERFLOW: To Float Screen, Unit 43 via Cross Flow Screen

UNDERFLOW: To Sink Sc reen, Unit 69 via. Cross Flow Screen

CONSTRUCTION for 20" diameter, 20° cycloid:

INTAKE BODY:	NiHard with diaphragm pressure gauge, 6" intake
OVERFLOW:	NiHard orifice and 10" outlet bonnet
APEX NOZZLE:	NiHard with flange for connection to cycloid

DESIGN: Flanged intake and overflow connections. Flanged and gasketed sections to replace any part. Overflow orifice and underflow nozzle available in graduated sizes to adjust operation.

REFERENCE: Drawing No. E-3734-1

ALTERNATE: 24" diameter, 20° cycloid has 7" intake, 12" overflow and similar construction for nominally equal duty.

GMG:djc

UNITS OF CROSS FLOW SCREENS

McNally Reversible Cross Flow Screens are tabulated below.

UNIT	SCREEN	QTY.	SIZE LxW (inch)	OPENING mm	KLEENSLOT SCREEN DATA
42	Floats Cross Flow	1	48x48	1	DOA 132
68	Sinks Cross Flow	1	48x24	1	DOA 132
86	Vibrating Cross Flow	1	48x24	½	DOA 100

Cross flow Screens are fitted with Kleenslot 430 stainless steel wire laid perpendicular to flow. Screens consist of 1/4" plate sluice box carrying wedged-in screen panel in 60° from level position, all mounted on double pivoted joint for support on separate bed. To reverse wear on screen, tilt box to 30° from level and rotate assembly periodically. 2" oak wedged holddown stringers act as side liners at screen. (Ref. drawing No. E-3738-1-1).

Unit 86 is furnished with electric vibrator mechanism.

AKM:djc

UNIT 46 - CLEAN COAL CENTRIFUGE

NAME: C-M-I Continuous Centrifugal Dryer

MODEL: EB-36", special

QUANTITY: One (1)

DUTY: Receive 50 TPH of 3/8" x 0 clean coal containing 20 TPH of 14M x 0 and water for a feed of about 65% solids; or a similar 1½" x 0 feed.

DESCRIPTION: Dryer is complete with machine sheave, V-belts, belt guard, motor base, pressurized lubrication system using gear pump coupled to countershaft, and modified wear parts, launder and rotor. 8" P.D. C-section sheave is included separately for the motor below.

MOTOR: 50 HP, 1800 rpm, NEMA B, vertical shaft-downward motor

GMG:djc

UNIT 48 - CLEAN COAL SCREW

QUANTITY: One (1)

RECEIVES: Filter cake and clean coal from centrifuge, Unit 46.

DISCHARGES TO: 24" W.C. Belt Conveyor, Unit 104.

CAPACITY: 50 TPH

DIAMETER: 18" Screw

LENGTH: 23 ft. horizontal

TYPE: 1/4" thick section flight butt-welded on 3½" schedule 80 pipe.

END SHAFT: High carbon steel bolted into pipe.

END BEARING: Split brass strapped to support on end plate; tapered roller bearing in drive unit.

TROUGH: Curved 1/4" abrasion resistant steel plate with 12 gage cover. End plates are fabricated steel.

DRIVE: 5 HP Screw Conveyor Drive with drive shaft, drive and thrust bearings, trough seal, motor mount and trough end; V-belt drive for 1800 rpm motor to Falk or equal, 215-JSC-24.

CHUTE: 1/4" steel construction at outlet.

AKM:djc

UNIT 50 - TELL-TALE SCREEN

QUANTITY: One (1)

NAME: McNally Tell-Tale Screen

SIZE: 2'-6" long x 2'-0" wide

RECEIVES: Effluent from Centrifuge, Unit 46.

DISCHARGES: Overproduct to Screw Conveyor, Unit 48.
Through product to Drainage Sump.

SCREEN: Bronze wedge wire with 1mm opening.

DESCRIPTION: Steel 3/16 plate sluice box with diffusion feed channel and wedge panel.

AKM:djc

UNIT 54 - DILUTE MEDIUM THICKENER

QUANTITY: One (1)

RECEIVES: Dilute medium and coal slimes from float and sink screens, Unit 43 and 69.

OVERFLOW: To clarified water sump, Unit 56.

UNDERFLOW: To magnetic separator, Unit 60.

MAKE (Equivalent): EIMCO Slurry Thickener Mechanism for 20 feet diameter x 8 feet deep steel tank. Type BXX, 18000 ft. lb. torque, Extra Heavy Duty supported on superstructure that rests on tank walls.

DRIVEHEAD: Ball bearing mounted main gear with gear and chain transmission to 2 HP motor. All gearing and bearings run in oil, enclosed in drive housings. A torque indicator and drive control assembly is provided in conjunction with a 1 HP motorized 24" lifting device. At predetermined torque setting all rakes and scrapers rise automatically until load is reduced. Mechanism must be lowered by pushbutton control when overload is corrected.

INSTRUMENT: Torque transmitter and strip chart recorder.

RAKE MECHANISM: Two long and two short rake arms attach through spiders to the vertical center shaft driven by the gearhead. Bottom of shaft is fitted with cone scrapers.

AKM:djc

UNIT 54 - DILUTE MEDIUM THICKENER (Continued)

BRIDGE: Steel beam design superstructure to support mechanism, feed sluice, walk and normal operating load. Includes steel feedwell at center.

TANK: See Unit 55 for tank, discharge cone and overflow weir.

AKM:djc

UNIT 55 - THICKENER TANK

QUANTITY: One (1)

RECEIVES: Dilute medium from rinsing screens, Unit 43 & 69.

UNDERFLOW: To Magnetic Separator Feed Pump, Unit 58.

DIMENSIONS: 20' diameter and 8' high.

CONSTRUCTION: 1/4" steel plate for sides and bottom of tank, overflow weir and 90° discharge underflow cone. Concrete filled tank bottom sloped to match angle of thickener rakes.

AKM:djc

UNITS 59 & 118 - DISTRIBUTORS

UNIT 59 - DILUTE MEDIUM DISTRIBUTOR: One (1) required to feed thickened medium to Magnetic Separator Unit 60.

UNIT 118 - TABLE DISTRIBUTOR: One (1) required to limit feed to Coal Table Unit 119.

DESCRIPTION: McNally fabricated steel, stationary, gravity feed tank approximately 2 ft. in diameter x 2 ft. high with splash cover for pumped inlet. Bottom outlet is arranged with replaceable orifices of 1" thick plate selected to regulate the flow. The excess discharges through the overflow outlet.

CONSTRUCTION: 1/4" plate sides, 3/8" plate bottom and 10 gage cover.

GMG:djc

UNIT 60 - MAGNETIC SEPARATOR

QUANTITY: One (1)

FEED: Dilute medium as thickener underflow

DISCHARGE:

CONCENTRATES: Magnetic solids to cycloid feed sump

TAILINGS: Non-magnetic and overflow slimes to flotation feed sump

TYPE: Double drum wet magnetic separator, first stage concurrent and second stage counter-rotation, permanent magnet type.

DRUM: 30" diameter by 36" magnet width, 40" overall drum width.

TANK ASSEMBLY: Structural steel frame, and stainless steel tank assembly with feed surge overflow control box, weir type adjustable side overflow pulp level control and concentrate spray bar.

DRIVE: Chain and sprockets with guard for two 1½HP TEFC motors, 230/460 volts, 60 cycles, 3 phase AC supply.

AKM:djc

UNIT 62 - HEAVY MEDIUM CONTROLS

TYPE: Pneumatic density and level control for heavy medium cycloid circuit.

CYCLOID FEED DENSITY OPERATION

Recovered magnetite from magnetic separators, heavy medium from float and sink screens, raw magnetite from the storage bin and controlled diluting water passes through a "Halliburton" or equal densometer via splitter box. The densometer sends air signal to the recording controller where specific gravity is recorded on a 24-hour circular chart. The recording controller sends air signal to a water control valve. An increase in density causes the valve to open more, letting in more water to dilute the medium. When medium density is low, the water valve is closed. The density controller has measurement range of 1.00 to 2.00 specific gravity.

CYCLOID H.M. SUMP LEVEL OPERATION

The cycloid feed sump level is controlled by a differential pressure cell (d/p cell) mounted on side of the sump. The 'd/p' cell is calibrated to work from the operating level in the sump. If the sump level drops below the operating level, the 'd/p' cell will send air signal to the level controller, which in turn will start the raw magnetite feeder, Unit 64. The feeder will remain on until the sump reaches the operating level.

CONTROL CABINET

One (1) 12 gauge steel control cabinet is supplied to receive compressed air supply and house controllers. Cabinet includes pressure gauges, reducing valves and filter, copper tubing, piping and conduit.

GMG:djc

UNIT 63 - MAGNETITE BIN

QUANTITY: One (1)

RECEIVES: Raw magnetite

DISCHARGES: To Screw Feeder, Unit 64

CAPACITY: 15 tons (150 pounds/cubic ft.).

PLATES: 1/4" side, 1/4" bottom, 10 gage cover.

LINER: 1/4" A.R. liner on sloping bottom only.

DIMENSIONS (Approximate):
6' Diameter
10' Overall Height

AKM:djc

UNIT 64 - MAGNETITE SCREW FEEDER

QUANTITY: One (1)

RECEIVES: Raw magnetite from storage bin, Unit 63.

DISCHARGES TO: Cycloid Feed Sump, Unit 36

CAPACITY: One TPH at 150 lbs. per cu. ft.

DIAMETER: 6" Screw R.P.M.: About 7, single speed

LENGTH: 5 feet horizontal

TYPE: 3/16" thick section flight butt-welded on 2" schedule 80 pipe.

END SHAFT: High carbon steel bolted into pipe

END BEARING: Split brass strapped to support on end plate; tapered roller bearings in drive unit.

TROUGH: Curved 3/16" abrasion resistant steel plate with 16 gage cover. End plates are fabricated steel.

DRIVE: 3/4 HP Screw Conveyor Drive with drive shaft, drive and thrust bearings, trough seal, motor mount and trough end; V-belt drive for 900 rpm motor to Falk or equal, 215-JSC-24 Class I at 7 RPM.

CHUTE: 1/4" steel construction at outlet.

AKM:djc

UNIT 72 - SECONDARY CRUSHER

QUANTITY: One (1)

MAKE (Equivalent): Williams Patent Crusher & Pulverizer Co.

TYPE: Model 30 NF Hammer Mill

RECEIVES: 1½" x 0 coal from Sink Screen and R.C. Screen

CAPACITY: 30 TPH to 14M x 0 product. 3/8" x 0 product can be obtained by changing complete set of cage bars provided extra with this unit.

CONSTRUCTION: Heavy steel plate welded frame, strongly reinforced, with metal trap and easy access to all working parts and protected by renewable abrasion resistant steel liners. Roller bearings are contained in sealed housings.

DRIVE: V-Belts to 75 HP, 1800 RPM motor on rails.

GMG:djc

UNIT 78 - 8" PRIMARY TRICONES

NAME: McNally-Visman Tricones

SIZE: 8"

QUANTITY: Eight (8)

TOTAL FEED: 794 GPM water plus 35 TPH maximum of fine coal

OVERFLOW: To Classifying Cyclone Feed Sump

UNDERFLOW: To Secondary Tricone Circuit

DESCRIPTION: NiHard construction with feed and overflow chambers, vortex, compound cone, apex valve and tail piece. Feed and overflow are 3" diameter.

GMG:djc

UNIT 83 - 14" CLASSIFYING CYCLONES

MAKE: McNally Pittsburg, cycloidal intake

SIZE: 14" diameter, 14°

QUANTITY: Three (3)

TOTAL FEED: 720 GPM water plus 25 TPH (Max.) of fine coal

OVERFLOW: To flotation feed sump

UNDERFLOW: To centrifuge via cross-flow screen

CONSTRUCTION:

INTAKE BODY:	NiHard, with diaphragm pressure gauge, 4" intake
OVERFLOW:	NiHard orifice, heavy wall steel 6" elbow and body cover
SUPPORT BODY:	NiHard cylinder
UPPER CONE:	NiHard one-piece
UNDERFLOW CONE:	Cast iron jacket with three-part "Carbofrax" ceramic liner and nozzle

DESIGN: Flanged intake and overflow connections. Flanged and gasketed sections to replace any part. Overflow orifice and underflow nozzle available in graduated sizes to adjust operation.

REFERENCE: Drawing E-3325-2

GMG:djc

UNIT 94 - FLOTATION CELLS

QUANTITY: One (1), 6-cell machine

RECEIVES: 5 TPH of 1/2mm x 0 coal in 708 gpm of water

DISCHARGES: Clean coal to filter; tailings to tailing sump

MAKE (Equivalent): GALIGHER No. 36 AGITAIR, 6-cell single row unit

DESCRIPTION: Flotation cells are 3/16" M.S. welded tanks. Arrangement is feed box - 3 cells - combination junction box - 3 cells - tail box. Bottom wear pads and side wear liners of the tank are covered with natural rubber. Each cell is provided with a shaft with bearing assembly, rubber covered flange type impeller and companion stabilizer. Motor and bearing assembly brackets are included. 4" air header is provided with individual cell - air control valves. The flotation machine will have single side froth discharge and a set of froth paddles. Automatic darts for sand gates are provided in junction and tail boxes.

DRIVES: Two (2) 3 HP single V- drives for 2 single cells, two (2) 5 HP dual V-drives for 2 dual cells and one (1) 1/4 HP, 36 rpm gear motor and drive arrangement for froth paddles. V-drives are for 1800 rpm motors.

BLOWER: One (1) 240 CFM SUTORBILT or equal, Model 4LB complete with pressure relief valve, V-belt drive, guard and extended base for 3 HP, 1800 rpm motor.

GMG:djc

UNIT 97 - CLEAN COAL FILTER WITH CHUTE

RECEIVES: 5 TPH maximum of 1/2mm x 0 coal fines

DISCHARGES: To clean coal screw conveyor

QUANTITY: One (1)

MAKE (Equivalent): Peterson Filters & Engineering Company

SIZE: 6' dia. x 6 disc, having 300 sq. ft. of area

TANK: Floor mounted, fabricated steel plate with overflow and drain connections, and full length discharge chute and feed box. Partitioned for two or four disc operation.

DISC ASSEMBLY: 10-sector, Radial Flow, with steel radial rods and clamps; 60 x 40 mesh stainless steel wire filter medium.

CAKE DISCHARGE: "Dual Guide" scrapers with mild steel blades and renewable polypropylene tips.

DISC SHAFT: Cast iron with cored ports and trunnion bearings.

VALVE: Cast iron, full flow with two vacuum and one blower connections on one end of filter.

DRIVE: Enclosed wormgear coupled to gear reducer having 1 HP Reeves motor pulley vari-drive for 2 to 6 MPR at filter.

AGITATOR: Two (2) Model 600 TPA propeller units each with 1 HP vari-speed drive.

(Continued)

GMG:djc

UNIT 97 - CLEAN COAL FILTER WITH CHUTE (Continued)

LEVEL CONTROL: Liquid level is maintained by automatic recirculating filtrate when transmitter signals drop in control level.

CHUTE: 1/4" steel plate to the clean coal screw conveyor, Unit 48.

GMG:djc

UNIT 98 - FILTER AUXILIARIES W/SEAL TANK

The following equipment are in conjunction with the filter Unit 97 for its operation.

FILTRATE PUMP: Worthington or equal, 1½" CNFE-74, 70 to 100 gpm, 60 feet total head, coupled to 5 HP, 1800 rpm motor.

BLOWER: Sutorbilt or equal, No. 3L Rotary Blower, V-belt driven from 5 HP, 1800 rpm motor. Includes extended base, inlet filter and relief valve.

VACUUM PUMP: Sutorbilt or equal No. 1011, vertical, single-stage wet rotary pump, driven 1260 rpm through V-belts from 100 HP, 1800 rpm motor. Requires 5 GPM of seal water. It includes a 6" VDY-L silencer.

VACUUM RECEIVER: 30" x 60" mild steel dished head, cone bottom, double tangent inlet.

SLUG TRAP: 24" x 48" mild steel dished head, cone bottom.

SEAL TANK: Drawing No. D-4206-5, of 3/16" plate with overflow pipe and drain.

GMG:djc

UNIT 103 - REAGENT EQUIPMENT

REAGENT TANK: One steel rack for four (4) 55 gallon drums.

REAGENT FEEDER: Two (2), each BIF Industries or equal, duplex positive displacement type with 1/4HP, 1800 rpm drive motor.

GMG:djc

UNIT 108 - 24 x 4 CLEAN COAL CONVEYOR

RECEIVES: Clean coal from 24" Belt Conveyor, Unit 104.

DISCHARGES TO: Loading Boom, Unit 109.

CAPACITY: 50 TPH

SPEED: 100 FPM

TERMINAL CENTERS: 41' horizontal

LIFT: 26'

SCRAPERS: 24" x 4" x 1/4" at 24" c/c

CHAIN: Two #678 DFR with extended pins; heat-treated chain

DRIVE TERMINAL SPROCKET: 5-tooth MacAlloy

BEARINGS: Babbitted

TAKE-UP: Protected screw

DRIVE: 10 HP, 1800 RPM NEMA B motor; 84 RPM output coupled reducer on base; ASA 120 chain drive.

STEEL FRAME COMPONENTS: Trough of 3/16" side plates and 1/4" abrasion resistant bottom plate; angle chain guides; 1/4" 1040 track bars; rigid terminal beds with 10 gage shield.

CHUTE: 1/4" plate at outlet.

AKM:djc

UNIT 115 - 8" SECONDARY TRICONES

NAME: McNally-Visman Tricones

SIZE: 8"

QUANTITY: Six (6)

TOTAL FEED: 454 GPM water plus 20 TPH maximum of fine coal

OVERFLOW: To tailing sump

UNDERFLOW: To Deister ore table or to tailing sump

DESCRIPTION: NiHard construction with feed and overflow chambers, vortex, compound cone, apex valve and tail piece. Feed and overflow are 3" diameter.

GMG:djc

UNIT 119 - DEISTER COAL TABLE

QUANTITY: One (1)

RECEIVES: 7 TPH, 3/8" x 0 or 14M x 0 primary Tricone Underflow through distributor, Unit 118

DISCHARGES: Coal and refuse to tailing sump Unit 101

MAKE: Deister Concentrator Company

TYPE: Super Duty Diagonal-Deck No. 7 Coal Washing Table (single deck); with riffled rubber cover, steel base members and anti-friction headmotion drive mechanism.

MOUNTING: Floor

DRIVE: V-belts and drive guard

MOTOR: 3 HP, 1200 RPM NEMA B motor

AKM:djc

UNIT 122 - ROTARY DISTRIBUTOR

MAKE (Equivalent): Deister Concentrator Co.

TYPE: Concenco 109 Distributor, 3-way, revolving type

QUANTITY: One (1)

DUTY: Receives 15 TPH, 14M x 0 (or 3/8" x 0) pulp underflow from Secondary Tricones, Unit 115 and splits into 2, 2 and 11 TPH pulp increments. The two 2 TPH parts are fed to two ore tables, Unit 123 and the 11 TPH goes to the tailing sump, Unit 101.

CONSTRUCTION & OPERATION: Main frame is angle and channel steel; tanks are 1/4" steel plate with hard steel liners in areas of abrasion; and machine is complete with rubber splash skirt, steel top cover and necessary inlet and outlet connections.

Upper tank revolving in anti-friction bearings receives feed and divides outlet through several bottom orifices to stationary splitter tank below, which is partitioned to discharge the increments through bottom pipe outlets.

DRIVE: 3/4 HP, 3 phase, 60 cycles, 230/460 volts, 20 RPM, vertical, TE, gearmotor direct connected through flexible coupling.

GMG:djc

UNIT 123 - DEISTER ORE TABLES

QUANTITY: Two (2), each as follows

RECEIVES: 2 TPH, 3/8" x 0 or 14M x 0 Secondary Tricone Underflow through distributor, Unit 122

DISCHARGES: Ore and refuse to tailing sump

MAKE: Deister Concentrator Company

TYPE: Super Duty Diagonal Deck No. 6 Concentrating Table (single deck); with riffled rubber cover, steel base members and anti-friction headmotion drive mechanism.

MOUNTING: Floor

DRIVE: V-belts and drive guard

MOTOR: 2 HP, 1200 RPM NEMA B motor

AKM:djc

UNIT 131 - REFUSE PIPE & SUPPORTS

Refuse from pump, Unit 130 is fed through steel box at upper end of approximately 430 feet of 10" diameter extra strong steel pipe sloping gradually towards refuse pond located north of preparation plant.

Pipe is supported by bents and a tower of tubular construction having 6" diameter legs and 4" diameter bracings. Each span between supports has 3/4" diameter rod truss where required.

AKM:djc

UNIT 136 - SUMP PUMPS

QUANTITY: Two (2), each as follows

LOCATION: One (1) at ROM Hopper
One (1) at Main Plant

MAKE (Equivalent): Deming (Crane Co.)

TYPE: Vertical, No. 4511, Size 2S

DUTY: 125 GPM, 40 feet total head, 1750 RPM, 11/16" maximum solids, 7 feet deep setting

CONSTRUCTION: Cast iron with strainer, steel shaft with guide bearings in 3" diameter pipe column, bearing at motor coupling, 3" discharge pipe to 28" diameter 3/8" thick support plate, ball float, NEMA 1 float switch and brass rod.

MOTOR: Vertical, 2 HP, 1800 RPM, 230/460 volts, 3 phase, 60 cycles.

AKM:djc

UNIT 138 - SUSPENDED MAGNET

MAKE (Equivalent): Dings Magnetic Separator Company

QUANTITY: One (1)

TYPE: Dings No. 1 high intensity Electro-Overhead Stationary Magnet, 24" wide x 30" long x 13" deep. Magnet requires 1570 watts at 115 volts D.C.

TROLLEY: 1½ ton capacity

APPLICATION: At trajectory of 24" raw coal belt conveyor Unit 26 carrying 75 TPH of 1½" x 0 coal at 150 fpm.

RECTIFIER: Model 8S607M Silicon rectifier, 2 KW, 3 phase, 60 cycle, 240/480 volts.

GMG:djc

UNIT 139 - AIR COMPRESSOR

MAKE (Equivalent): Gardner-Denver Model T 1000 LT-12 vertical, air-cooled, two stage, duplex cylinder compressor complete with suction unloading valves, automatic start and stop control, V-belt drive, drive guard and Model 5A113 screen type filter-silencer. Compressor is mounted on base plate and welded to a 120 gallon horizontal air receiver complete with relief valve, pressure gauge, and globe valve.

SIZE: 7½ and 4¾ x 4½ at 870 R.P.M.

PISTON DISPLACEMENT: 100 CFM

FREE AIR DELIVERED: 74 CFM

DISCHARGE PRESSURE: 125 PSI

MOTOR: 20 HP, 1800 RPM for V-belt

AKM:djc

UNIT 140 - SERVICE ELEVATOR

QUANTITY: One (1)

MAKE (Equivalent): DOVER Electric Traction Elevator

SERVICE: Freight Handling

CAPACITY: 4000 pounds live load

SPEED: 100 FPM

TRAVEL: 48 feet approximate

LANDINGS: Five (5) including 1st floor with all openings on same side.

FLOOR GUARDS: Five (5) enclosures 7 ft. high of 16 gage steel mesh with 6070 double swing industrial steel doors.

CAR DOORS: Manual horizontal folding gate.

CAR: 5'-8" wide x 5'-6" deep platform with 7'-6" headroom, #14 steel panel walls 3-sides, non-skid floor plate, #10 expanded metal top, car light and push button station.

HOIST MACHINE: Overhead geared traction with high torque, 30-minute rated motor, d-c brake on worm shaft, speed governor and hoist sheave on support beams.

CONTROL: 460 volt, 3 phase, 60 cycles, full magnetic equipment in NEMA 4 cabinets. Includes dry rectifier for d-c to brake.

GENERAL: Elevator complete with guides, shoes, cables, counter-weights, buffers in pit, 110 volts lighting, call buttons

AKM:djc

UNIT 140 - SERVICE ELEVATOR (Continued)

and "in-use" signal lights at each floor, terminal overtravel switches, self leveling (±½"), interlocks for safety of open doors and running elevator, and other standard equipment.

ERECTION: Complete installation, local wiring and adjustment in suitable hoistway.

AKM:djc

UNIT 141 - SANITARY FACILITIES

One (1) change room next to the preparation plant is equipped with the following sanitary fixtures and facilities:

Four (4) showers;
Two (2) Urinals, wall type with strainer, and flush;
One (1) closet bowl, with seat, flush and roll holder;
Two (2) Lavatories with supplies, chain plug, P-trap;
One (1) Septic Tank with drain field.

Miscellaneous piping for supply distribution, vent and waste will be provided. Necessary water will be supplied in the change room.

One (1) 120 gallons Electric Water Heater, 5 KW.
The existing well water supply system at washery will be utilized for sanitary use and Dust Suppression Unit 144.

AKM:djc

UNIT 143 - BIN INDICATORS

HIGH LEVEL CUT-OFF SWITCHES

QUANTITY: Two (2)

LOCATION: Two (2) Raw Coal Bins, Unit 19

NAME: McNally-Pittsburg Paddle type high level bin switch.

PADDLE: Counterweighted, pivoted with mounting bracket and adjustable arm.

SWITCH: G.E. single circuit vane operated limit switch or equal with condulet.

REFERENCE: Drawing D-4047-15

BIN LEVEL MONITORS

QUANTITY: Two (2)

LOCATION: Two (2) Raw Coal Bins, Unit 19

NAME: Monitrol level gaging equipment.

DESCRIPTION: Monitrol sounder with MK VIII counter console. Sounding button on the console when depressed drops the stainless steel tape attached plumb-bob into the bin. Potentiometer monitors motorized reel mounted tape length lowered into the bin. When plumb-bob contacts top surface of coal pile, the motorized reel reverses and retracts the plumb-bob. Depth reading is visually presented on indication meter on the console. When new sounding is taken, the information is automatically cancelled.

AKM:djc

LOW LEVEL INDICATOR

QUANTITY: One (1)

LOCATION: Magnetite Bin, Unit 63.

MAKE: The Bin-Dicator Company or equal.

DESCRIPTION: Roto-Bin-Dicator, rotating paddle type, level indicating device, with low torque, slow speed motor and paddle extended into the bin.

AKM:djc

UNIT 144 - DUST SUPPRESSION SYSTEM

The following Aquadyne Corporation or equal system is furnished beginning at the ROM Reciprocating Reeder and continuing in the Rotary Breaker and two Raw Coal Crusher areas.

The system operates from a clean water supply pumped through Hydroblenders, to misting spray nozzles located in the above areas for effective dust suppression. Pilot controls start sprays when coal flow is detected.

The following are recommended equipment used in this system:

(a) Aquadyne Hydroblenders, Type 100 B or equal.
(b) Allis-Chalmers or equal, Model F-34, flanged, 2" x 1½" single suction pump with 20 HP, 3600 RPM TEFC motor for 50 GPM at 400 ft. total head. Pump is cast iron, bronze fitted standard construction with enclosed impeller for use in clean water.
(c) Necessary dust hoods.
(d) Valves, strainers, spray nozzles, pressure gages.
(e) Galvanized, standard weight steel piping.

AKM:djc

UNIT 145 - SERVICE HOISTS

ELECTRIC HOIST: One (1) 2-Ton, 56 ft. lift with 3 HP motor in Preparation Plant building to hoist machinery.

MANUAL HOISTS: Two (2) 1½-Ton, 10 ft. lift, with geared trolley, in Preparation Plant building for maintenance service.

AKM:djc

UNIT 146 - PIPING

GENERAL PIPING: Our customary standard weight of pipe will be supplied, that is: 3/8" wall for 14" and larger; about schedule 30 for 12, 10 and 8"; and schedule 40 for 6" and smaller. Where E.S. is noted, it will be 1/2" wall for 10" and larger, schedule 80 for smaller sizes. 1½" and smaller pipe is threaded. 2" and larger pipe is welded with necessary flanged joints except where equipment dictates threaded joints. McNally valves, elbows and flanges are used in the sizes produced and procured in other sizes or for selected service.

Piping includes black steel pipe, fittings, couplings, valves, sprays, hangers and special platework for the following circuits:

CYCLOID CIRCUIT: From sump through pump to H.M. Cycloids, using E.S. pipe for medium and coal handling.

CLARIFIED WATER: From sump through pump to screen sprays, Secondary F.C. Sump and tables as shown.

THICKENER UNDERFLOW: Thickened dilute medium underflow from tank through M-S Feed Pump to Magnetic Separator, using E.S. pipe for this pumped medium handling.

FINE R.C. CIRCUIT: From sump through pump to Primary Tricones via splitter, using E.S. pipe for raw coal handling.

CLASSIFYING CYCLONE CIRCUIT: From sump through pump to Classifying Cyclones handling fine clean coal.

HMG:djc

UNIT 146 - PIPING (Continued)

FLOTATION FEED CIRCUIT: From sump through pump to Flotation Cells handling coal slimes or the mesh-size fraction.

TAILINGS CIRCUIT: From sump through pump to settling cone, or in emergency by-pass to pond refuse line.

SECONDARY TRICONE CIRCUIT: From sump through pump to Secondary Tricones via splitter, or alternately to Deister Coal Table; and handling a refuse grade coal as sinks from Primary Tricones.

REFUSE CIRCUIT: From sump through pump to gravity line run to refuse pond, using E.S. pipe for this service.

FRESH WATER CIRCUIT: Float carried suction line from fresh water pond No. 2 to F.W. Pump #2 and line to washery service, Clarified Water Sump and Seal Pump. Gland sealing water extends to pumps where required.

MISCELLANEOUS: Filter circuit, sump pumps, compressed air, natural gas, cone piping, sluice service, drains, overflows, gravity feeds or other flow conduits required for plant operation.

GMG:djc

UNIT 147 - VENTILATING FANS

QUANTITY: Two (2), one each in control room and Unit 20 tunnel under storage bins, as described below:

CONTROL ROOM FAN

DESIGN: Pressurize electrical room to prevent infiltration of dust laden air current. Outside air enters duct through filters to inside fan having guard over discharge. Counter balanced exhaust shutters in wall remote from fan relieves room pressure according to blade opening position.

DUCT: 16 gage steel to support filters and fan; access to filters.

FILTERS: V-banked, 2" thick Evans or equal, washable aluminum.

FAN: Propellair (R & M) or equal, 16" direct to 1/4HP, 1800 rpm motor. Rated 2,460 CFM at 1/8" S.P.

SHUTTER: Ruskin or equal, counter balanced type, 16 in. sq.

TUNNEL FAN

DESIGN: Tunnel under storage bins is equipped with two steel pipes provide inlet dust and gas to be exhausted by wall mounted fan.

FAN: Propellair or equal 24" direct to 1/2HP, 1800 rpm motor. Rated 3,100 CFM at 1/2" S.P., provided with fan guard.

AKM:djc

UNIT 148 - HEATING SYSTEM

This unit includes necessary gas fired hot air heating systems for Preparation Plant and Analytical Laboratory buildings as follows:

PREPARATION PLANT

MAKE: E.K. Campbell Company or equal heaters

QUANTITY: Three (3) each as follows:

CAPACITY: 2,000,000 B.T.U. output approximate

COMPONENTS:

1. Induced draft fan complete with 3/4 H.P. motor.
2. Blower with 15 HP, 1800 rpm motor.
3. Automatic temp controls, pressure regulators, motor starters, safety devices and thermostats.
4. Necessary grills, ductwork and dampers.

ANALYTICAL LABORATORY & OFFICE

MAKE: E.K. Campbell Company or equal heater and summer ventilation.

QUANTITY: One (1)

CAPACITY: 1,000,000 B.T.U. output approximately.

COMPONENTS:

1. Induced draft fan complete with 3/4 HP motor.
2. Blower with 7½ HP, 1800 RPM motor.
3. Pre-heater and fan with 7½ HP, 1800 RPM motor.
4. Automatic temperature controls and pressure regulators, motor starters, safety devices and thermostats.
5. Necessary grills, ductwork and dampers.
6. Five (5) ceiling exhaust fans.
7. Auxiliary electric heaters with thermostats for rooms as shown on our drawing E-4065-P_3.

AKM:djc

UNIT 150 - LABORATORY IN PREPARATION PLANT

Coal Preparation Plant Laboratory has been adequately provided with space for sample storage, preparation, filtration, drying, screening and float and sink work. At suitable places water, drainage and electrical outlets have been provided. Dust collection system from the sample preparation room is vented to the stack. Fumes from chemicals are passed through chemical traps to remove chlorinated compounds or acid fumes from the exhaust system prior to release to atmosphere through concrete plenum chamber and stack to prevent air pollution and health hazards. Arrangement of laboratory equipment has been shown on drawing no. E-4065-N, and includes all laboratory and sample preparation equipment as per the following pages 150.1, through 150.7 inclusive.

Unit includes removal of all existing equipment and steel in present plant that is necessary to make room for the laboratory and storage space as shown on drawing, and erection of all new steel, siding, concrete floors, drains, installation of laboratory equipment, wiring, lighting, piping, and painting to complete same.

We have collaborated with Commercial Testing and Engineering Company in the design and purpose of this facility.

CHL:djc

McNALLY PITTSBURG SO-62521

H. E. W. Contract No. PH-22-68-59

SAMPLING

Quantity	Catalog No.	Description	Electrical	Unit Price	Total Price
63		Bins for Material, Dynalab No. 1T96,97		130.00	8,190.00
300		Tubs		4.00	1,200.00
1		Toledo 2181 Scales with Digital Readout and wheeled stand & pan		3,400.00	3,400.00
10		Dollies		200.00	2,000.00
4		2 wheel carts		100.00	400.00
150		Sample Cans (Milk)		16.00	2,400.00
300 ←		Canvas Sample Bags		3.35	1,005.00
				TOTAL	$18,595.00

COMMERCIAL TESTING & ENGINEERING CO.

McNALLY PITTSBURG SO-62521

H.E.W. Contract No. PH-22-68-59

FILTRATION

Quantity	Catalog No.	Description	Elect.	Floor Space	Unit Price	Total Price
20		Denver-2' x 2' Simplex Lab. Pan Filters			786.00	15,720.00
1		Denver-Nash Model CL-403 Vaccuum Pump	25 hp, 3 phase, 208V		4329.00	4,329.00
1		Dings Submerged Belt Wet Type Magnetic Separator Model XW-5	208 V 3 phase 400 Watts-110DC		3250.00	3,250.00
				TOTAL		23,299.00

COMMERCIAL TESTING & ENGINEERING CO.

McNALLY PITTSBURG SO-62521

H.E.W. Contract No. PH-22-68-59

DRYING

Quantity	Catalog No.	Description	Electrical	Unit Price	Total Price
1		Microwave Unit 3 Phase	200 KVA (440 Volt)	150,000.00	150,000.00
500		Trays		5.00	2,500.00
1		Mark V Radarange	1300 Watts	3,000.00	3,000.00
2		Small Radarange	500 Watts ea.	500.00	1.000.00
1		Table, Custom Built			200.00
					$156,700.00

COMMERCIAL TESTING & ENGINEERING CO.

McNALLY PITTSBURG SO-62521
H.E.W. Contract No. PH-22-68-59

SCREENING

COMMERCIAL TESTING & ENGINEERING CO.

Quantity	Catalog No.	Description	Electrical	Unit Price	Total Price
2		Metler P-5000 Balance		1,000.00	2,000.00
2		Toledo 9955 Scales with Remote Data Transfer & Digital Readout		4,700.00	9,400.00
2	F-5022A	Standing Type Desks McMaster Carr		60.00	120.00
5	CL-325 H	Testing Screens, Gilson ☐ Hydraulic Clamping	110 V, 60 C 1-1/3 HP	656.50✓	3,282.50✓
5	CL-337	Anti-vibration mountings		350.00	1,750.00
5	CL-334	Tray Rack, Gilson		33.00✓	165.00
5	CL-335	Door Enclosure, Gilson		27.50✓	137.50
10✓	CL-331	Test-Timers, Gilson		15.00✓	150.00
5	CL-326	1-1/2" Screen		30.00	150.00
5	CL-326	3/4"		30.00	150.00
5	CL-326	3/8"		30.00	150.00
5	CL-327	14		38.00✓	190.00
5	CL-328	28		42.00	210.00
5✓	CL-340	Rotaps rigged for Wet Screening	-1/4 HP,110V,60C	900.00	4,500.00
5 Sets		8" Sieves 14,28,48,60,100,150, 200,250, 325		300.00/Set	1500.00
1		Bench, Custom Built			200.00
					$24,055.00

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McNALLY PITTSBURG SO-62521

H.E.W. Contract No. PH-22-68-59

FLOAT & SINK

Quantity	Catalog No.	Description	Electrical	Unit Price	Total Price
10		Float & Sink Cabinets-Custom		Est. 400.00	4,000.00
2		Budget Electric Hoists	1 HP, 208 V each	375.00	750.00
2		Coarse F & S Cabinets, Custom		1000.00	2,000.00
10		Float & Sink Tanks-Custom		250.00	2,500.00
4		Drum Lifters & Supports		180.00	720.00
350'		5/8" Teflon Tubing		6.60/ft	2310.00
3		Exhaust Fan	5 HP,208 V	750.00	2,250.00
60		Float & Sink Separators		45.00	2,700.00
4	POM-964	Batch Oven with Roll-in Racks Blue M	208V, 3 phase 14 KW each	9,766.00 ✓	39,064.00
		Racks & Apparatus-Custom		2,000.00	2,000.00
		F & S Ventilation with positive motor driven dampers and chemical traps		3,000.00	3,000.00
2		Toledo 9955 Scales with Remote Data Transfer & Digital Readout		4,700.00	9,400.00
2		Metler P-5000		1,000.00	2,000.00
2	F-5022A	Standing Type Desks-McMaster Carr		60.00	120.00
10	21-3980	Pump, Liquid, Randolph		143.00	1,430.00
1		Torsion Solution Balance		250.00	250.00
				TOTAL	$74,494.00

COMMERCIAL TESTING & ENGINEERING CO.

McNALLY PITTSBURG SO-62521

H. E. W. Contract No. PH-22-68-59

Sample Prep.

Quantity	Catalog No.	Description	Electrical	Unit Price	Total Price
1		Denver-Jaw Crusher 5" X 6"	5 HP,208 v	1650.00	1,650.00
1	Model 1700	Holmes Crushing & Cutting Station	7-1/2 HP 3 phase,208 v	6221.25	6,221.25
1		Holmes Slope Hoist for above	5 HP, 3 Phase 208 Volt	3125.00	3,125.00
1	Model 401	Holmes Crusher, 10 X 15	7-1/2 HP, 3 Phase, 208 V	1354.50	1,354.50
1	Model 201	Holmes Crusher 7 X 6	2 HP-3phase 208 Volt	934.50	934.50
2	Model 500	Holmes Pulverizer, C Vain Speed Control	1 HP each 115 Volt	693.00	1,386.00
2	91-7970	Riffle, Holmes Model 15, Hopper-12-5/8' x 9-7/8" x 23-1/4" High		148.05	296.10
		Work Tables-Custom Built		500.00	500.00
1		Refuse Conveyor	1½HP Est.	3000.00	3,000.00
2	Model 5	Holmes Riffle & Feed Hopper		165.90	331.80
6 ✓	Model 11	Holmes Riffle Buckets, 1" Openings		57.75	346.50
6 ✓	Model 12,	Holmes Riffle Buckets, 1/2" Openings		67.20	403.20
6 ✓	2B50	Containers for Riffles		33.60	201.60
2	91-6420	Preiser-Crusher, Bucking Board Type Model B, 24" X 36"		195.25 ✓	390.50
2	91-6310	Preiser-Filling Funnel, Coal Sample Bottle PS-800		41.80 ✓	83.60
30 ✓	21-5783	Respirator, Face Masks + Refills		6.00 ✓	180.00
		208V- Preparation Dust Collection System	5 HP,	4000.00	4,000.00
60 ✓		Hard Hats		6.50 ✓	390.00
				TOTAL	$24,794.55

COMMERCIAL TESTING & ENGINEERING CO.

McNALLY PITTSBURG SO-62521

H.E.W. Contract No. PH-22-68-59

LAB.

Quantity	Catalog No.	Description	Electrical	Unit Price	Total Price
4	WB-1421	Work Bench-Style 3, 60"		220.00	880.00
1	91-2071	Preiser Moisture Ovens	32KW-208 3PH	1611.00	1,611.00
32	91-2265-65	Trays		6.00	192.00
2	20-6325	Residual Moisture Ovens-120V 1400 W		475.00	950.00
1		Mettler P-5000 Balance		1000.00	1,000.00
1		Sample Mixer-Custom Made		400.00	400.00
4	LCU 32-H	Rascher & Betzold-Corner Cab.		139.00	556.00
4		Colorceran Tops for same		119.00	476.00
4	SU1CC-59	Colorceran Sinks		450.00	1,800.00
30	PAC-6B	Fume Hoods c Plastic Exterior		1,700.00	51,000.00
30	D9C	Exhaust Blowers for above	1/3 HP	157.00	4,710.00
30	D8A	Air Supply Blowers	1/6 HP	77.00	2,310.00
8	WB-1393	72" Cabinets & Sliding Doors		273.00	2,184.00
10	LK47H	Cabinets		200.00	2,000.00
10		Colorceran Tops for above		90.00	900.00
6	BM-47	Extra Heavy Balance Tables		220.00	1,320.00
6	LRUC2230	Chairs		52.00	312.00
30		Gas, Electrical, Water Serv. for Hoods		140.00	4,200.00
12		Calorimeter Heaters, Parr 1501	500W,115V	158.00	1,896.00
100	6795	Pyroceran Electric Hotplate, Model PC-351	600W,120V	119.00	11,900.00
1		Truck		3,000.00	3,000.00

COMMERCIAL TESTING & ENGINEERING CO.

UNIT 151 - ANALYTICAL LABORATORY & OFFICE

The present building about 1800 ft. east of the Preparation Plant shall be remodeled and equipped as shown on our drawing No. E-4065-P. Drawings E-4065-P_1, P_2 and P_3 show additional details in the same building but the heating system is covered by Unit 148.

We have collaborated with Commercial Testing & Engineering Co. in the design and purpose of this facility and therefore have planned on sufficient operating space and provided the necessary equipment to complete the laboratory duties.

The office, computer and conference rooms shall be furnished with the office machines, files, desks, tables, etc., necessary for their use. The other building areas include their necessary equipment and furnishings, of which are indicated on the drawings or listed on pages 151.1 and 151.2.

Unit includes complete remodeling of existing structure as per drawings and installation of laboratory equipment, wiring, lighting, piping and painting to complete same.

CHL:djc

McNALLY PITTSBURG SO-62521

H.E.W. Contract No. PH-22-68-59

OFFICE

Quantity	Catalog No.	Description	Electrical	Unit Price	Total Price
3		Friden Electronic Calculators	110 V.	1,000.00	3,000.00
5 ✓		IBM Typewriters		600.00	→ 3,000.00
6 ✓		Manager Desk & Chairs		350.00	→ 2,100.00
6 ✓ UT	UT70-31	Tables		165.00	→ 990.00
8 ✓		Files R&B, Horizontal S Drawer EE-3 letter Cole		339.30	→ 2,714.40
2 set		Shelves, Book		100.00	200.00
2		Steel Storage Cabinet R&B $76 Cole		120.55	241.10
7 ✓		Desks, Steno		250.00	→ 1,750.00
7 ✓		Chairs R&B WS5		91.50	→ 640.50
1 ✓		Temperature-Hunidity Indicator			
		Conference Room Furnishings		Est.	5,000.00
		Lobby Furniture			→ 600.00
2 ✓		Time Clocks		250.00	500.00
					$20,786.00
1		Water Heater	10 KW 208V 1 PH		
5		Air Conditioners	3 KW 208V 1 PH		
1		Air Conditioner	4 KW 208V 1 PH		
2		Ceiling Fans 1/2HP	110V		
1		Well Pump 3HP			
		Heating & Vent	See Unit 148		

COMMERCIAL TESTING & ENGINEERING CO.

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UNIT 151 - ANALYTICAL LABORATORY & OFFICE

The present building about 1800 ft. east of the Preparation Plant shall be remodeled and equipped as shown on our drawing No. E-4065-P. Drawings E-4065-P_1, P_2 and P_3 show additional details in the same building but the heating system is covered by Unit 148.

We have collaborated with Commercial Testing & Engineering Co. in the design and purpose of this facility and therefore have planned on sufficient operating space and provided the necessary equipment to complete the laboratory duties.

The office, computer and conference rooms shall be furnished with the office machines, files, desks, tables, etc., necessary for their use. The other building areas include their necessary equipment and furnishings, of which are indicated on the drawings or listed on pages 151.1 and 151.2.

Unit includes complete remodeling of existing structure as per drawings and installation of laboratory equipment, wiring, lighting, piping and painting to complete same.

CHL:djc

McNALLY PITTSBURG SO-62521

H.E.W. Contract No. PH-22-68-59

OFFICE

Quantity	Catalog No.	Description	Electrical	Unit Price	Total Price
3		Friden Electronic Calculators	110 V.	1,000.00	3,000.00
5 ✓		IBM Typewriters		600.00	3,000.00
6 ✓		Manager Desk & Chairs		350.00	2,100.00
6 ✓ UT	UT70-31	Tables		165.00	990.00
8 ✓		Files R&B, Horizontal S Drawer EE-3 letter Cole		339.30	2,714.40
2 set		Shelves, Book		100.00	200.00
2		Steel Storage Cabinet R&B $76 Cole		120.55	241.10
7 ✓		Desks, Steno		250.00	1,750.00
7 ✓		Chairs R&B WS5		91.50	640.50
1 ✓		Temperature-Hunidity Indicator			Est. 5,000.00
		Conference Room Furnishings			600.00
		Lobby Furniture			
2 ✓		Time Clocks		250.00	500.00
					$20,786.00
1		Water Heater	10 KW 208V 1 PH		
5		Air Conditioners	3 KW 208V 1 PH		
1		Air Conditioner	4 KW 208V 1 PH		
2		Ceiling Fans 1/2HP	110V		
1		Well Pump 3HP			
		Heating & Vent	See Unit 148		

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COMMERCIAL TESTING & ENGINEERING CO.

McNALLY PITTSBURG SO-62521

H.E.W. Contract No. PH-22-68-59

PAGE II

LAB.

Quantity	Catalog No.	Description	Electrical	Unit Price	Total Price
6		Balances, Sortorius Model 2603		1,000.00	6,000.0(
1	Model D-1	500 Gram glass tank, Denver Lab. Flotation Machine		740.00	740.0(
		Lab. Ventilation Systems less Blowers		10,000.00	10,000.0(
		Sectional Steel Shelving		1,500.00	1,500.0(
28		6' Filter Racks, Custom made		150.00	4,200.0(
10		Stools		60.00	600.0(
6	Model 8600 F-2	Electric Furnaces c Inconel Muffles	208 V,3 PH 6 KW	1,910.00 ✓	11,460.0(
6	Model 8600 F-2	Electric Furnaces c Inconel Muffles c West	208V, 3 PH 6 KW	3,160.00 ✓	18,960.0(
4		Spare Thermocouples		15.00	60.0(
6		Spare Heating Elements		180.00	1,080.0(
10 ✓		Laboratory Carts		120.00	1,200.0(
12 ✓	10-8427	Automatic Burets		75.00 ✓	900.00
14		Johnson Gas Burners		600.00	8,400.0(
1	Model C-44	Hobart Dishwasher	208 V, 3 PH, 15 KW Heater 1-1/2 HP Motor	7,744.00	7,744.0(
10		CO_2 Fire Extinguishers (Lab & Test Area in Plant)		140.00	1,400.0(
1		First Aid Emergency Kit			40.0(
				→	$167,881.0(

Page 151.2

COMMERCIAL TESTING & ENGINEERING CO.

UNIT 152 - COMMUNICATION SYSTEM

One Femco Inc. industrial pagephone system or equal is provided essentially as follows:

One (1) Amplifier with cabinet in control room of washery.
Seven (7) Weatherproof pagephone stations in washery.
One (1) Weatherproof station in float-sink room of laboratory in preparation plant.
One (1) Handset phone with built-in speaker for location at loading out track.
Two (2) Wall mounted pagephone stations in Raw Coal Bins.
Two (2) Wall mounted stations in Analytical Laboratory and office.
Ten (10) Trumpet type speakers.

NOTE: The above system includes phone cables.

AKM:djc

UNIT 153 - CAR SHAKEOUT

QUANTITY: One (1)

LOCATION: On railroad cars over the R.O.M. Hopper, Unit 2.

DUTY: Mounted on car side to loosen the frozen bulk coal for unloading during winter.

MODEL (Equivalent): Model RV9809 Syntron Rotary Vibrator Car Shaker complete with flexible cable, starter switch, counter weight car hook and lifting bail; 460 volts, 60 cycles.

CRANE: One (1) Jib Crane with geared trolley.

HOIST: One (1) 2 Ton electric hoist attached to the Jib Crane Trolley for hauling the car shaker.

√

AKM:djc

UNIT 158 - ELECTRIC HEATING

Sixteen (16) Radiant Heaters, 3.6 KW each, Chromalox U-RAD-LT or equal, will be provided to prevent freeze-up and/or provide comfort in the following areas:

Fresh water pump house #1 - Two (2) to prevent freeze-up.
Fresh water pump house #2 - Two (2) to prevent freeze-up.
Change Room near Prep. Plant - Six (6) for comfort.
Truck Scale House - Two (2) for comfort.
R.O.M. Hopper - Two (2) to prevent freeze-up.
Loading Operators Cab - Two (2) for comfort.

Heat will be themostatically controlled for heaters which prevent freeze-up. Manual switches will generally control heaters used for comfort.

The total connected heating load is approximately 58 KW from 440 volts, 3 phase, 60 cycle.

AKM:djc

UNIT 163 - RAILWAY TRACKAGE

Unit to include all necessary railway trackage to service the pilot plant for the incoming raw coal and the outgoing washed coal as shown on McNally-Pittsburg Drawing E-4065-Q.

Unit includes all necessary engineering, earth work, ballast, ties and tracks to bring the present plant track yard system into a serviceable condition and as shown on Drawing E-4065-Q.

The extent of this proposal on yard trackage is up to the Right Of Way on the mainline railroad at point 'A' as shown on Drawing E-4065-Q and beyond this will be the responsibility of the Milwaukee Railroad and is not covered by this proposal.

CHL:djc

MOTOR AND CONTROL LIST, UNIT 164

		MOTORS						CONTROLS			
UNIT	EQUIPMENT	QTY	HP	RPM	NEMA	DRIVE	REMARKS	QTY	STARTER	SIZE	REMARKS
3	ROM Feeder	1	10	1800	B	VB		1	FVNR	1	
4	R.C. Crusher	1	125	1200	B	VB		1	FVNR	5	
5	48 x 10 ROM Conveyor	1	100	1200	B	Chain		1	FVNR	4	
6	48 x 14 Br. Feed Convr.	1	100	1800	B	Chain		1	FVNR	4	
7	ROM Screen	1	7½	1800		VB	Pres.	1	FVNR	1	
8	Rotary Breaker	1	40	720	B	VB		1	FVNR	3	
12	Raw Coal Sampler	1	1	56			Gr. Mtr. 3#Br.	1	Rev.	1	
13	Motorized Gate	1	3/4	900	B		6# Br.	1	Rev.	1	
14	30" R.C. Storage Belt	1	50	1800	B	Chain		1	FVNR	3	
16	Motorized Gate	1	3	900	B		25# Br.	1	Rev.	1	
17	30" R.C. Trans. Convr.	1	7½	1800	B	Chain		1	FVNR	1	
22	Vibr. Feeders	2		ELECTROMAGNETS				2	ACB		
24	24" R.C. Conveyors	2	5	1800	B	Chain		2	FVNR	1	
26	24" Wshy. Feed Convr.	1	7½	1800	B	Chain		1	FVNR	1	
28	Raw Coal Crusher	1	75	1800	B	VB		1	FVNR	4	
29	Motorized Gate	1	3	900	B		25# Br.	1	Rev.	1	
30	Raw Coal Sampler	1	1	56			Gr. Mtr. 3# Br.	1	Rev.	1	
32	Raw Coal Screen	1	10	1800	C	VB		1	FVNR	1	
34	Coarse R.C. Sampler	1	1	56			Gr. Mtr. 3# Br.	1	Rev.	1	
37	Cycloid Feed Pump	1	125	1800	B	VB		1	FVNR	5	
43	Float Screen	1	10	1800	C	VB		1	FVNR	1	
45	Float Coal Sampler	1	1	56			Gr. Mtr. 3# Br.	1	Rev.	1	
46	Cln. Coal Centrifuge	1	50	1800	B	VB	Shaft Down	1	FVNR	2	

MOTOR AND CONTROL LIST, UNIT 164

		MOTORS						CONTROLS			
UNIT	EQUIPMENT	QTY	HP	RPM	NEMA	DRIVE	REMARKS	QTY	STARTER	SIZE	REMARKS
48	18" C.C. Screw Convr.	1	5	1800	B	VB		1	FVNR	1	
54	Dil. Med. Thickener	1	2	1800	B	Chain		1	FVNR	1	
	Lifting Mechm.	1	1	900	B	VB		1	Rev.	1	
56	Plug Valve	1			80	LB-FT.	STALL TRQ.	1	FVNR	1	
57	Clrfd. Water Pump	1	75	1800	B	VB		1	FVNR	4	
58	Septr. Feed Pump	1	20	1800	B	VB		1	FVNR	2	
60	Magnt. Separator	2	1½			Chain	TEFC W/Unit	2	FVNR	1	
64	Magnt. Scrw. Feedr.	1	3/4	900	B	VB		1	FVNR	1	
69	Sinks Screen	1	7½	1800	C	VB		1	FVNR	1	
71	Cors. Snks. Sampler	1	1	56			Gr. Mtr. 3# Br.	1	Rev.	1	
72	Secndy. Crusher	1	75	1800	B	VB		1	FVNR	4	
77	Fine Coal Pump	1	60	1800	B	VB		1	FVNR	4	
82	Clas. Cyln. Fd. Pump .	1	50	1800	B	VB		1	FVNR	3	
86	Vib. Cros. Flw. Screen	1			0.5	KW VI	BTR. W/Unit	1	FVNR	1	
88	Srn. Ovrprdt. Sampler	1					W/Unit	1	Rev.	1	
92	Flotn. Feed Pump	1	25	1800	B	VB		1	FVNR	2	
94	Flotation Cells										
	Agitators	2	3	1800	B	VB		2	FVNR	1	
	Agitators	2	5	1800	B	VB		2	FVNR	1	
	Skimmer	1	¼	36			Gr. Mtr. W/Unit	1	FVNR	1	
	Blower	1	3	1800	B	VB		1	FVNR	1	
97	C.C. Filter	1	1				W/Unit	1	FVNR	1	
	Filter Agitators	2	1				W/Unit	2	FVNR	1	
98	Filtrate Pump	1	5	1800	B	Direct	W/Unit	1	FVNR	1	
	Filter Blower	1	5	1800	B	VB		1	FVNR	1	

MOTOR AND CONTROL LIST, UNIT 164

ITEM	EQUIPMENT	MOTORS QTY	HP	FRAME	DRIVE	REMARKS	CONTROLS QTY	CONTROLS START	CONTROLS SIZE	CONTROLS REMARKS
98	(Continued)									
	Filter Vacm. Pump	1	100	1800 B	VB		1	FVNR	4	
102	Tailings Pump	1	40	1800 B	VB		1	FVNR	3	
103	Reagent Feeders	2	¼	1800	Dir.	W/Unit	2	FVNR	1	
104	24" W.C. Belt	1	5	1800 B	Chain		1	FVNR	1	
106	W.C. Sampler	1	1	56		Gr. Mtr. 3# Br.	1	Rev.	1	
108	24 x 4 C.C. Conveyor	1	10	1800 B	Chain		1	FVNR	1	
109	Loading Boom	1	15	1800 B	Chain		1	FVNR	2	
110	Boom Hoist	1				Pres.	1	ACB		
114	Send. F.C. Pump	1	25	1800 B	VB		1	FVNR	2	
119	Deister Coal Table	1	3	1200 B	VB		1	FVNR	1	
122	Rotary Distributor	1	3/4	20		Gr. Mtr. W/Unit	1	FVNR	1	
123	Deister Ore Tables	2	2	1200 B	VB		2	FVNR	1	
130	Refuse Pump	1	25	1800 B	VB		1	FVNR	2	
132	Fresh Water Pump #1	1				Pres.	1	FVNR		
134	Fresh Water Pump #2	1	30	1800	Dir.		1	FVNR	3	
135	Seal Water Pump	1	5	3600	Dir.		1	FVNR	1	
136	Sump Pumps	2	2	1800 B	Dir.	Vertical W/Unit	2	FVNR	1	
138	Suspended Magnet	1				2 KW	1	ACB		W/Unit
139	Air Compressor	1	20	1800 B	VB		1	FVNR	2	
140	Service Elevator	1	12½			TEFC W/Unit	1	ACB	2	W/Unit
141	Washery Well Pump	1	2			W/Unit	1	FVNR	1	
144	Acquadine System	1	20	3600 B			1	FVNR	2	
145	Service Hoist	1	3			W/Unit	1	ACB	1	
147	Tunnel Fan	1	½	1800	Dir.	W/Unit	1	FVNR	1	
	Control Room Fan	1	¼	1800	Dir.	W/Unit				

MOTOR AND CONTROL LIST, UNIT 164

		MOTORS						CONTROLS			
UNIT	EQUIPMENT	QTY	HP	RPM	NEMA	DRIVE	REMARKS	QTY	STARTER	SIZE	REMARKS
148	Heating Systems										
	Blowers	3	15	1800	B	VB		3	ACB		
	I.D. Fans	3	3/4				W/Unit				W/Unit
	Blower	1	7½	1800	B	VB		1	ACB		
	I.D. Fan	1	3/4				W/Unit				W/Unit
	P-Heat Fan	1	7½	1800							W/Unit
	Exhaust Fans	5					W/Unit		110V		
150	Lab in Prep. Plant						See Unit 150				
151	Anyl. Lab. & Office						See Unit 151				
153	Car Shake Out	1	5				W/Unit	1	FVNR	1	
	Hoist	1	3				W/Unit	1	Rev.	1	
158	Electric Heating						56 KW.		FVNR		

UNIT 164 - MOTORS AND CONTROLS (Continued)

All Motors, unless noted otherwise on the Motor and Control List, shall be continuous rated, severe duty, squirrel cage induction motors with a service factor of 1.0, for 40°C ambient temperature and for an altitude below 3300 feet. All motors shall be in totally enclosed (fan cooled or non-ventilated) construction. All motors shall have cast iron frames and end brackets, ball bearings with grease and drain ports and oversized, gasketed cast iron conduit boxes with threaded conduit connections and sealed motor leads. All motors shall have long shafts suitable for V-belt drives even though they are to be applied direct coupled. All motors shall comply in full with the current NEMA motor standards.

Each motor shall be sized in accordance with the starting torque and power requirements of the machine it drives. All motors on vibrating equipment, such as centrifuges and vibrating screens, shall be of suitable construction for such heavy duty vibrating service. Generally, motors shall be for service on 230/460 volts or 460 volts, 3 phase, 60 cycles but some small or fractional horsepower motors may be for service on 208 volts, 3 phase or 115 volts single phase. Sliding take-up bases shall be provided with motors with V-belt drives. All disc type brakes mounted on motors shall have watertight covers and coils suitable for 460 volts, not just 230 volts.

JHM:djc

480 VOLT MOTOR CONTROL CENTERS

Controls for 460 volt motors shall be combination magnetic, full voltage starters with air circuit breakers. The air circuit breakers shall have interrupting capacity of 15000 Amp. symmetrical short circuit current and shall be sized according to the manufacturer's recommendations. Each starter shall have two (2) ambient-compensated overload relays. Motor control voltage shall be 460 volt, 60 cycle and each starter shall be provided with a fused control circuit. All starters shall be suitable for installation of up to 3 extra interlock contacts. All control wiring originating in the starter shall be terminated in terminal blocks and a minimum of two (2) spare terminals shall be provided for field use. All cable terminals shall be clamp type copper. The control wire terminals shall be numbered in accordance with instructions from McNally Pittsburg. All starters and air circuit breaker feeders shall have laminated, plastic nameplates.

The maximum motor horsepower that will be used with each NEMA size starter is:

10 HP - Size 1	100 HP - Size 4
25 HP - Size 2	200 HP - Size 5
50 HP - Size 3	400 HP - Size 6

The 480 volt motor controllers and necessary air circuit breaker feeders shall be front mounted in two (2) motor control centers. The motor control centers shall be NEMA Class 1, Type B wiring for 600 volt, 3 phase, 60 cycle. The motor control centers shall consist of vertical sections (approximately 20"w x 20"d x 90"H) bolted together to form a rigid, free standing dead front NEMA 1 enclosure. Each vertical section shall contain a 300 amp. vertical bus and vertical wiring trough. Each motor control center shall have a continuous horizontal copper bus rated for 600 amp. and braced for 25,000 amp. symmetrical short circuit current, except at the center-located incoming line section. The center-located incoming line section of the control centers shall have a horizontal

JHM:djc

480 VOLT MOTOR CONTROL CENTERS (Continued)

copper bus rated for 1200 amp. and braced for 25,000 amp. The main bus will be located in the top of motor control centers. The control centers, "CC1" and "CC2" shall each be connected to its respective power transformer by cable entering the bottom of the incoming line section. Provisions shall be made for outgoing cables at the bottom of the structures. Each control center will be provided with a full length ground bus with 410 ground lugs.

OUTDOOR UNIT SUBSTATIONS

Two (2) Outdoor Unit Substations, "PT1" and "PT2", are required to transform power for "CC1" and "CC2" respectively. Each unit substation shall have a high voltage incoming line compartment with a disconnect switch and lightning arrestor. Provisions shall be made to receive power from an overhead line and loop-feed other substations.

Each transformer shall be of the oil-filled, outdoor type, rated for 1000 KVA at 65°C rise, 12.4KV delta to 480/277 volts wye, 3 phase, 60 cycles. The neutral shall be brought out for future grounding. Standard high voltage taps and accessories and provisions for future forced air cooling shall be included.

The low voltage side of each substation shall be provided with a 1200 amp. secondary air circuit breaker of the manually operated, switchboard type rated at 50,000 ampere interrupting capacity at 480 volts. The secondary breaker shall be key interlocked with its respective disconnect switch in the high voltage section. Three (3) panel type voltmeters (0-500) shall be mounted on the low voltage compartment and connected wye for phase ground detection. An equipment ground bus with 4/0 ground lugs shall be provided.

JHM:djc

OUTDOOR UNIT SUBSTATIONS (Continued)

One (1) Outdoor Unit Substation, "PT3", is required to supply 4160 volts, 3 phase, 60 cycle service to an overhead line to feed the Fresh Water Pump House #1. The unit substation will be provided with fused cutouts and lightning arrestors. The transformer shall be of the oil-filled, outdoor type, pole-mounted, rated for 45 KVA at 65°C rise, 12.4KV delta to 4160 volts delta, 3 phase, 60 cycle.

One (1) Outdoor Unit Substation, "PT4", is required to transform power for the Analytical Laboratory and Office. The unit substation shall be provided with fused cutouts and lightning arrestors. Provisions shall be made to receive power from an overhead line. The transformer shall be of the oil-filled, outdoor type, pole-mounted, rated for 300 KVA at 65°C rise, 12.4 KV delta to 208/120 volts wye, 3 phase, 60 cycles. The neutral shall be brought out for grounding.

The load side of the above four Outdoor Unit Substations, "PT1", "PT2", "PT3", and "PT4" shall be arranged for cable connections to their respective motor control centers or distribution panelboards.

GENERAL CONTROLS

NEMA 4 pushbutton and selector switch stations shall be provided for local operation of certain process equipment. Pilot controls for the proper operation of the equipment proposed herein shall also be provided. Ammeters shall be provided for such process equipment as crushers, centrifuges and certain process pumps and will be mounted on the operator's control panel.

JHM:djc

UNIT 165 - ELECTRICAL AUXILIARIES

One (1) Washery operator's pushbutton control panel with graphic flow panel above complete with flush mounted oil-tight push-buttons, selector switches, indicating lights and ammeters shall be provided. Necessary control relays, timers and terminal boards shall be mounted internally and all devices shall be wired complete to the terminal board. Field wiring may be accomplished through hinged doors on the rear. The panel shall be vertical and of steel construction finished with lacquer outside and with industrial paint inside.

One (1) loading operator's pushbutton control desk with hinged sloping top shall be provided complete with flush mounted push-buttons, indicating lights and necessary meters. Control relays, timers, and terminal boards shall be mounted internally and all devices shall be wired complete to the terminal boards. Field wiring may be accomplished through removeable front panels. The desk shall be of steel construction finished with lacquer outside and with industrial paint inside.

One (1) wire trough of steel construction shall be provided for each motor control center and operator's control panel located on an elevated floor. The wire troughs are provided with access doors and are provided as a means to terminate conduits and to extend wires up to control centers and control panels.

UNIT 166 - ELECTRIC WIRING DRAWINGS

The following electric wiring drawings shall be provided:

1. One line power distribution and control wiring diagrams.
2. One line interlocking diagram.
3. Elementary control diagrams.
4. Arrangement drawings of motor control centers and operators control panels.
5. Control wiring connection diagrams.
6. Conduit and wiring drawings.
7. Lighting drawings.

JHM:djc

BUILDING MATERIAL UNITS

The following group of building materials described by Units 167 to 177 inclusive will cover the category of materials outlined and will be as needed for these particular portions of the alteration of the existing buildings, that is, the Preparation Plant Building, the Garage (to be converted to a Testing Laboratory and Laboratory Office) and the Sanitary Building.

UNIT 167 - STRUCTURAL STEEL

Miscellaneous structural steel framing for revision of the existing preparation plant building floors, for the new 30" Raw Coal Storage Conveyor, the house over the Raw Coal Storage Bins, the 24" Washery Feed Belt and necessary steel for building structure alterations.

UNIT 168 - STEEL FLOOR PLATE

Necessary 3/16" checkered plate with 2" x ¼" stiffener bars to be installed in the Preparation Plant Building and R.O.M. Hopper structure.

UNIT 169 - GRATING FLOORS & TREADS

A. Arrowhead Iron Works, or equivalent, rectangular pattern, steel floor grating, with 1¼" x 3/16" bearing bars and 3/8" deformed cross bars in weld assembly, to be tack welded to floor steel.

B. Arrowhead Iron Works, or equivalent, rectangular pattern, steel, stair treads, 7½" x 2'-6" or as needed to suit existing steel or special conditions, to be bolted to stair stringers.

C. One coat of black shop paint for grating and treads.

ALT:djc

UNIT 170 - SIDING, ROOFING, PARTITIONS & HOODS

A. Necessary Galbestos or equal, V-Beam siding to match existing siding, for Raw Coal Bin House.

B. Necessary galvanized corrugated steel, 22 gage, for Conveyor Hoods.

C. Light gage (.024") aluminum sheeting with 1/2" deep corrugations for interior partitions.

UNIT 171 - ROOF DECKING

New roof decking necessary for Raw Coal Storage Bin House plus required replacement decking for existing Preparation Plant Building. Supply Inland Steel, or equal, 18 gage galvanized steel 1½" deep, Type B form, 24" coverage per sheet.

UNIT 172 - ROOF DECK COVERING

A. Galvanized steel roofing, 22 gage, 38½" (covers 36"), with 6" end lap and 2½" side lap to be used as needed to repair present roofing and for R.C. Storage Bin House.

B. Necessary bonded roof for new R.C. Storage Bin House and for replacement of present roof, when required. Present roofs will be skim coated and resealed with vinyl #3000, 1 mil thickness.

UNIT 173 - WINDOWS AND DOORS

A. 7 - 20" x 30" basement type steel windows, glazed at site.

B. 20 - 3070 single doors.
3 - 6070 double doors.
1 - 6080 double door.
All to be Truscon Industrial Steel swing doors, clear 1/4" wire

ALT:djc

UNIT 173 - WINDOWS AND DOORS (Continued)

glass and glazing compound, using glazing angles of upper sash panel, applied in field.

UNIT 174 - CORNICE & FLASHING

Material will be galvanized steel sheets, vinyl coated, off-white color, for new roofing, new windows, roofing and corners, and as needed for repair of existing portions; roof flashing 22 gage, roof cornice, windows sill flashing and corner flashing 24 gage. Closure strips to be furnished with roofing and siding.

UNIT 175 - HANDRAIL AND TOE PLATE

A. New handrail will be added as needed for unprotected floors, walks, floor openings and stairs; 1-5/8" O.D. by 0.095" wall steel tubing, top rail 42" and mid-rail 24" above finished floor.

B. New toe plate will be added as required, to be welded to walk-side of posts or with bar to floor steel at machinery openings, 4" x 3/16" steel plate is mill lengths for field fitting 1/2" above the floor.

UNIT 176 - ROOF DRAINS

Existing drains will be used and to be repaired as required.

UNIT 177 - ELEVATED CONCRETE FLOORS

Nominal 4" above beams replacement and new concrete floors as required in the Washery Building, laid on 16 gage galvanized corrugated steel with 3/16" x 6" high curb plates. 3000 PSI reinforced concrete will be used. Floors will be pitched to drains.

ALT:djc

UNIT 178 - FIELD PAINT

Quality commercial paint will be provided for one coat after erection of all new and reused equipment and steel structure having access for painting.

Renovated areas will be primed before finish coat where needed.

Surfaces not to receive paint are wear, lubricated, or coated exteriors in the iron and steel type materials.

UNIT 179 - ANCHOR BOLTS

Machine bolts,bent anchors with nuts are supplied for embedding in new concrete for attachment of parts thereto. Other inserts for similar attachment are also provided where required.

ALT:djc

UNIT 180 - ELECTRIC WIRING

R.E.M.C. "Hoosier Energy" will bring 12.4 KV, 3 phase, 60 cycle power to our Ourdoor Unit Substations at the Washery. We shall deliver the 12.4 KV power to the Outdoor Unit Substation at the Analytical Laboratory and 4160 volt power to the Fresh Water Pump #1 House. We will bring 480/277 volt, 3 phase, 60 cycle service into the 480 volt Motor Control Centers in the Washery and continue therefrom. We will bring 208/120 volt, 3 phase, 60 cycle service into the 208/120 volt Distribution Panelboard in the Analytical Laboratory and continue therefrom.

We will furnish and install the electric wiring materials for the proper control and operation of the equipment furnished for Proposal No. 62621. This shall include all wire, cable, conduit and fittings for lighting, communications, grounding, heating, welding, power and control circuits for the proposed preparation plant and laboratory facilities.

All wiring shall be run in rigid galvanized steel conduit, 1/2" diameter minimum, with Crouse Hinds Form 8 Condulets and JIC totally enclosed dust tight wiring boxes. Flexible metal conduit with vinyl jacket will be used at motor connections.

Generally wire and cable shall be stranded copper, #12 gage minimum for power and lighting, #14 gage minimum for control circuit wiring. Stranded aluminum conductor shall be utilized for feeder lines and motor leads where the current equals or exceeds 90 amperes. Conductor insulation for 600 volt or less circuits will be 600 volt type "THW". Direct burial cable, when required will be style RR with heavy neoprene jacket.

GROUNDING:
All motors and other electrical equipment frames and bases, control equipment, panels, transformer supporting steel structure, building steel structures, metal cabinets, wiring devices and conduit systems shall be connected to the existing ground grid or loop.

JHM:djc

UNIT 180 - ELECTRIC WIRING (Continued)

Small motors (under 40 HP) are grounded through contact with building structural steel and conduit system. The rigid conduit system shall be bonded to the panel boards per NEA Code. Motors, metal panels and isolated steel framework shall be bonded to rigid conduit system using bonding conductors sized according to code. Bonding is to be included across all flexible motor connections and all conduit connections unless conduit connection is fully threaded.

LIGHTING:

Lighting shall be provided throughout the proposed facilities. The Analytical Laboratory, the Sample Laboratory in the Washery, the areas around operator's panels, Control Rooms and Offices shall be illuminated with fluorescent lighting to levels of 70 to 100 footcandles. The Washery in general and conveyor galleries shall be illuminated with incandescent lighting to levels of 10 to 30 footcandles. Incandescent vaportight fixtures shall be provided for underground and tunnel areas. Approximately 20-400 watt mercury vapor outdoor floodlights shall be provided for general area lighting around the Analytical Laboratory, Washery, Truck Scale House and loading facilities. 115 volt convenience outlets shall be provided throughout the Preparation Plant and Analytical Laboratory for hand tools and portable lighting operation.

WELDING:

Two (2) 100 amp., 460 volt, 3 phase, 60 cycle power feeders shall be provided to supply plug-in receptacles for portable welding machines. There shall be no less than one receptacle on each floor of the preparation plant.

JHM:djc

UNIT 181 - FOUNDATIONS

This proposal is based on foundations of 3000 PSI reinforced concrete, not exceeding a pier depth of 5 ft. below grade on 4000 PSF bearing; and on the basis of dirt excavation and same back fill. Piling, larger or deeper piers or rock excavation will be beyond this proposal and be extra to it.

Proposal includes all necessary new foundations and rework of old foundations to complete the pilot plant as shown on proposal drawings and as per preceding paragraph.

CHL:djc

UNIT 182 - ERECTION

Erection, for the purposes of this proposal, shall consist of unloading, assembly, installation and preliminary adjustment of all specified units, in accordance with our drawings and specifications and shall also consist of the dismantling, loading, hauling, and unloading of present units or parts of units, structures and supporting building items now within the present plant and facilities which must be disposed of to make room for new equipment structures and etc., to form a complete and integrated pilot plant.

This includes cleaning, repairing, or painting of all present equipment and buildings which are present and to be used as part of the proposed pilot plant.

As soon as possible after each machinery unit is installed, it will be lubricated and then operated empty and a complete check of its mechanical operation, alignment, clearance and rigidity will be made with necessary adjustments to insure proper operation.

Upon completion of erection and dismantling of erection equipment, all material and equipment dismantled from the present plant, and all waste, scraps and rubbish resulting from construction operations will be removed from the immediate site to make the plant area clean and operational.

CHL:djc